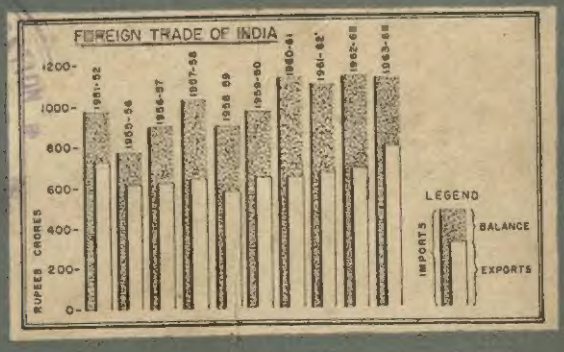
ECONOMIC AND COMMERCIAL GEOGRAPHY OF INDIA

A TEXTBOOK FOR SECONDARY SCHOOLS



National Council of Educational Research and Training


STATE INSTITUTE OF EDUCATION
Govt. of West Bengal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Economic and Commercial Geography of India

A Textbook for Secondary Schools

Commerce Textbook Panel

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Economic and Commercial Geography of India

A Textbook for Secondary Schools

National Council of Educational Research and Training

February 1970
Magha 1891

Rs. 3.20

Published at the Publication Unit, by Secretary, National Council of Educational Research and Training, N. I. E. Campus, Sri Aurobindo Marg, New Delhi 16 and printed by Shri D. D. Karkaria at Leaders Press Pvt. Ltd., 108, Seth Motishah Lane, Bombay-10.

Preface

There is a real need for good textbooks for the Higher Secondary Schools; this is particularly so in the case of commerce subjects. Most of the textbooks in the market are dull and lack this or that essential feature. They suffer from a lamentable lack of clarity and of ease of exposition.

Aware of this need, I readily accepted the invitation of the National Council of Educational Research and Training to act as the Chairman of the Commerce Panel set up to prepare model textbooks on commerce subjects for use in our Secondary Schools.

The present book is the second in the scheme. We were lucky in securing the services of an eminent scholar like Professor Dasgupta for preparing the book on "Commercial and Economic Geography". He has brought to it his rich experience and vast knowledge. To give the book a more extensive coverage, the contents in the book and their arrangement have been decided in consultation with more than 60 commerce teachers at school level representing different Boards and regions. The book is not a bare description of India's resources, industries, transport and trade like the common run of books on this subject but an analysis of their production, utilization and distribution so as to give an understanding of our economic development against the geographical background. All the figures in the text are given according to the Metric System which is now officially accepted in our country. A number of maps and charts are included to make the study of economic and commercial geography more interesting and fruitful. We have tried to give as much up-to-date data about the facts of economy as possible. The style of presentation is kept simple enough for the Higher Secondary level.

As our intention is to present the economic development in the context of geographical facts, frequent references are made to the Five Year Plan targets and their achievements. The last chapter has, therefore, been devoted to explain briefly the purport and importance of India's Five Year Plans.

Our thanks are due to all those who helped us. I am also thankful to the other colleagues in the panel and also to the members of the workshop for their helpful suggestions.

For Professor Dasgupta, the work has been a labour of love. If the book is widely read and wisely used, we shall feel amply rewarded.

I will be failing in my duty if I do not express my gratitude to Smt. Muriel Wasi, the former Officer on Special Duty in-charge of textbooks and Shri P. N. Natu, former Secretary of the National Council of Educational Research and Training for their support and co-operation which made my task as Chairman very easy.

K. T. MERCHANT
Chairman, Commerce Panel,
National Council of Educational Research and Training

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Ton	1	Inch	1
Metric Tonne	1.02	Millimetres	25.40
Pound	1	Acre	1
Kilogram	0.45	Hectare	0.41
Maund	1	Square Yard	1
Quintal	0.37	Square Metre	0.84
Mile	1	Gallon	1
Kilometre	1.61	Litres	4.55
Yard	1		
Metre	0.91		

(i) Based upon Survey of India Map with the permission of the Surveyor General of India.
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(ii) The demarcation of the Gujarat-West-Pakistan Boundary is in accordance with the Indo-Pakistan-Western Boundary case. Tribunal Award is in progress (1969).

Introduction

Definition of Economic and Commercial Geography

Economic and commercial geography is a systematic study of the economic resources, their utilisation and distribution as conditioned by physical and social surroundings of a country. To earn their living, people may be engaged in agriculture, fishing, forestry, mining, manufacture, trade, transport and commerce. The choice of any of such occupations and their development depends no doubt upon the conditions that are prevalent within a country, but knowledge, intelligence and culture of people engaged in them decide the nature and extent of their performance.

Nature has provided different types of resources in different parts of the world. Forests, fisheries, minerals, soils, rivers, lakes, seas, etc., are meaningless except in the context of their utilisation by men. In some areas, natural resources are abundant and within easy reach of men; in others, they are less plentiful and difficult to exploit. Men can overcome by their knowledge, intelligence and culture, various hurdles which stand in the way of maximum utilisation of the resources. In the process, men develop social and political systems to facilitate development for their own progress.

India's physical environment like location, climate, landforms, mountains, rivers, soils, forests, fisheries, mineral deposits and other conditions exist as something given by nature. The quality and character of its people have decided from the remote past the courses of development, from which one can see today a single co-ordinated economy.

Purpose of Studying Economic and Commercial Geography of India

In a vast country like India, diversity of physical conditions and social institutions must be very great. India has rightly been called a sub-continent. Geographical conditions—climate, soil, rainfall and topography—differ very widely within the country resulting in the difference of products and economic activities. The degree in the differences of products and their development depends on the quality of men. Yet, development in various parts of the country should be complementary to each other as far as possible and make for the optimum development of the country as a whole. Transport and markets are factors which ensure distribution, not only within the country but also with other countries. Economic and commercial geography of India explains how different areas, producing different commodities merge into a single producing system through transport and markets. Thus commodities, transport and markets are the three fundamental aspects of economic and commercial geography of India. These are to be understood in the background of India's physical environment and her people.

The study of economic and commercial geography of India gives an understanding of the pattern of development in the spheres of resources, transport and markets and, through them, an insight into the economic development as a whole.

Questions and Discussion Topics

1. *What is Economic and Commercial Geography?*

2. *Explain the purpose of studying Economic and Commercial Geography of India.*

3. *What are the fundamental aspects of Economic and Commercial Geography of India? How are they related to India's physical environment and her people?*

4. *Examine the conditions that determine the choice of occupations and their development in India.*

Chapter 1

Physical Environment

Location, Size and Area

India occupies a highly favourable situation for international commerce. It stands almost at the centre of the Eastern Hemisphere and at the head of the Indian Ocean. She commands all the sea routes for trade between the old and the new worlds—towards Africa and Europe in the West, Australia in the South, Thailand, China, Japan and America in the East. India can rightly boast of possessing natural frontiers, shut off, as it is, by the Himalayas on the North, by the Arabian Sea on the South-West and by the Indian Ocean on the South.

In respect of size, India is the seventh gigantic state in the world, being preceded by the U.S.S.R., China, Canada, Brazil, the U.S.A. and Australia. The Republic of India measures 3,219 km from north to south and 2,977 km from east to west and presents the form of a somewhat irregular equilateral triangle. The Republic has 32,76,643 sq. km of area, and administratively consists of 17 States and nine Union Territories. The seventeen States are: Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Jammu & Kashmir, Kerala, Madhya Pradesh, Tamil Nadu, Maharashtra, Mysore, Nagaland, Orissa, Punjab, Rajasthan, Uttar Pradesh and West Bengal. The centrally administered territories are Andaman and Nicobar Islands; Dadra and Nagar Haveli; Delhi; Goa, Daman and Diu; Himachal Pradesh; Laccadive, Minicoy and Aminidivi Islands; Manipur; Pondicherry and Tripura.

India has a coast-line of 5,689 km which gives one km of coast to every 1,024 sq. km of area. The coastline of India, in spite of its great length, is broken by only a small number of inlets and possesses a few islands around it. The continental shelf of the country is shallow and the shores are usually flat and sandy. Because of these physical characteristics, India possesses fewer ports and harbours in proportion to its coast-line. The Gulf of Cutch, the Gulf of Cambay, the backwaters of Cochin and Malabar, the Palk Strait and the Gulf of Mannar, and the indentations at the mouths of the Ganga are the inlets and straits of India. These are all shallow with the exception of the backwaters of Cochin and Malabar and permit navigation when they are made deep by dredging operations.

The east coast of India runs from the mouth of Haribhanga on the border between India and Pakistan along the Sundarbans in a westerly direction, to the Hooghly river. From the Hooghly, the coast proceeds south-west to the Krishna Delta, from where it continues south to Cape Comorin which is the southernmost point of India. The west coast runs from Cape Comorin. The coast runs north to the Gulf of Cambay, where the Kathiawar Peninsula juts out west from the mainland. The coast continues north-west from Kathiawar. (The opening, i.e., the gulf, between the north-west coast and the peninsula is known as the Gulf of Kutch.)

Natural Regions

Geographically India presents three natural divisions, each of which is quite unlike the

others. These divisions are based on physical conditions :

I. the Himalayan Region in the North;
II. the Northern *Plains;* and
III. the Peninsular Region.

I. The Himalayan Region in the North : The Himalayan Region runs for 3,200 km from the eastern extremity of Assam to the western limits of Kashmir with a breadth varying from 290 to 350 km and contains some of the highest peaks in the world. The Himalaya rises abruptly from the plains in the east and gradually in the west. The average height of the Himalaya is over 5,230 metres, and about forty peaks are known to exceed 7,348 metres. The best known of these peaks include Nanga Parbat (8,126 metres), Nanda Devi (7,817 metres), Dhavalgiri (8,172 metres), Mount Everest (8,848 metres), and Kanchanjunga (8,598 metres). The snow-line is at a height of about 6,000 metres, on the southern slopes of the Himalaya and higher on the northern slopes.

There are three parallel ranges in the Himalayas: (a) the Great Himalayas comprising the highest portion with an average height of 6,000 metres, (b) the Lesser Himalayas comprising the ranges with an elevation of less than 4,500 metres, and (c) the Outer Himalayas comprising the hills lying between the Lesser Himalayas and the plains. At the foot of the Outer Himalayas lies the Terai jungle—the abode of many wild beasts like yaks, bears, leopards and sambar on the west, panthers and tigers in the central part and elephants, tigers, etc., on the east.

The Himalayas act as a natural protective wall for India. In winter, they prevent the piercing cold winds of Central Asia from coming into India. They also provide rain-water for the plains by arresting the moisture-bearing clouds of the south-west monsoon. The Indus, the Ganga and the Brahmaputra along with their tributaries have their sources in the Himalayas. The Lesser and Outer Himalayas are very rich in animal and forest resources. There are extensive tea plantations in the Outer Himalayas from Assam to the East Punjab. In the Lesser Himalayas, the products are rice, chillies, ginger, tea, wheat and fruits. Physical difficulties do not permit cultivation beyond that limit.

The scenery and the mighty peaks of the Great Himalayas attract tourists from different parts of the world and thus provide a source of income to many hill stations as well as foreign exchange for the country.

II. The Northern Plains : This plain occupies the greater part of Northern India and covers more than 2,400 km from east to west with a width of 240 to 320 km. This Plain is formed by the basins of the Ganga, the Indus and the Brahmaputra with their tributaries. The geographical advantages are (a) fertile soil, (b) favourable climate, (c) flat surface rendering possible the construction of roads and railways, (d) rivers and (e) mineral products. In the Ganga plain, rainfall is heavy and agriculture is the chief occupation of the people. It contains more than 40 per cent of the total population of India. The western plain beyond the Ganga is more or less dry. Agriculture is practised with the help of irrigation. Although the region contains only 10 per cent of India's population, it has an extensive and well-developed system of irrigation.

III. Peninsular Region : This region is a tableland and lies within the tropics. It is bounded on three sides by mountains—on the north by the Vindhya and the Satpura ranges including the Malwa and the Aravalli plateaux, on the west by the Western Ghats and on the east by the Eastern Ghats. Two coastal strips of flatland exist on the outer side of both the Western and Eastern Ghats—the western coastal strip is known as the Konkan in the North and Malabar in the South; the eastern coastal strip is known as the Coromandal Coast.

The Western Ghats run along the Malabar Coast of India continuously for a distance of about 1,600 km down to Cape Comorin. The plain between the Ghats looks like an immense wall facing the ocean. The mean height is about 1,077 metres, the highest point being 2,637 metres (Doda Betta). The important passes connecting the central tableland and the west include the Palghat, the Thal, Bhorghat and Nama. The Nilgiris form the converging point of the Western and Eastern Ghats by which the Deccan is enclosed.

The Eastern Ghats stretch from the Mahanadi river valley for about 800 km south-eastwards to the nucleus of the Nilgiris. The mean height of the Eastern Ghats is scarcely more than 460 metres. The Eastern Ghats are much less elevated and do not form a continuous chain like the Western Ghats. The Eastern Ghats are at a much greater distance from the coast, the intervening low-lands averaging from 80 km to 140 km.

As the general slope of the tableland is from West to East, most of the rivers flow into the Bay of Bengal. The Mahanadi, the Krishna, the Pennar, the Cauvery and the Vaigai flow into the Bay of Bengal; the Tapti and the Narmada flow into the Arabian Sea. The Peninsular rivers are all rain-fed, and they turn into mere puddles during the dry season. The principal agricultural crops are cotton, tea, coffee, and spices. Cinchona, cocoanut and forest products are also available.

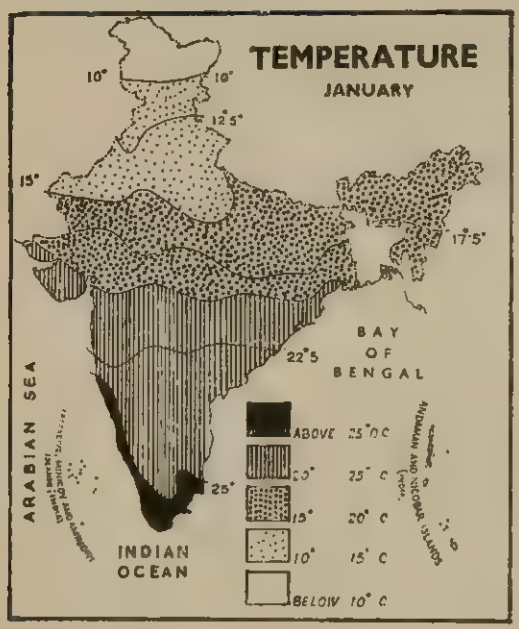
The Deccan is divided into five natural regions: (i) the narrow west-coast region from the Tapti to Cape Comorin receives the full force of the Monsoon from the Arabian Sea and consequently rainfall is over 2,500 mm. The soil is very fertile and the crops are rice, spices and fruits. (ii) The Black soil region in the centre is extremely fertile and suitable for cotton growing. Millets, oil-seeds and wheat are also cultivated. (iii) North-eastern Deccan has poor soil, but the rainfall is over 1,250 millimetres. Tank irrigation has developed most. Rice is the principal crop. (iv) Southern Deccan has poor soil and cultivation is possible only by means of irrigation. (v) The Eastern coastal plain is a low, alluvial land. The Northern region has summer rain and the southern region has winter rain. The average rainfall is between 1,000 to 1,500 millimetres. Rice is the principal crop. Millets and indigo are also raised.

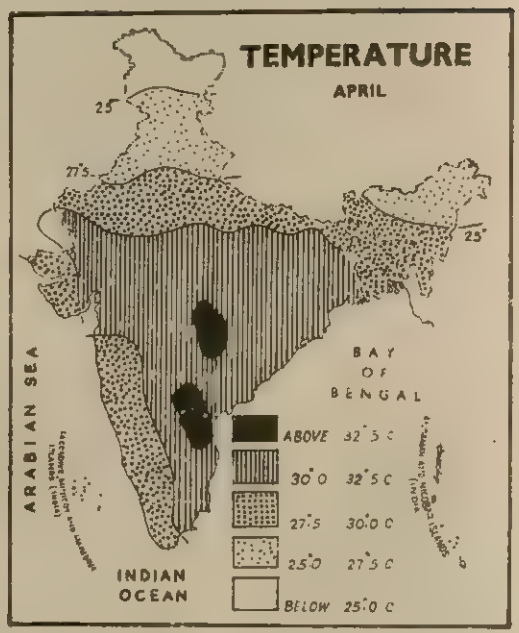
Climatic Zones and Distribution of Rainfall

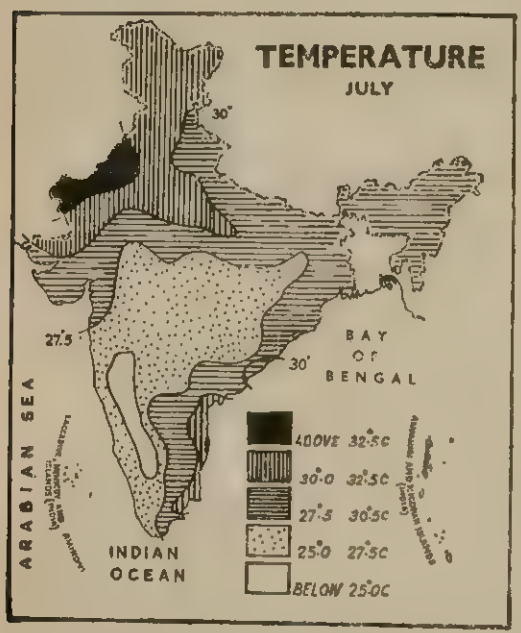
India is so vast in size and so varied in topographical features that a uniform climate does not prevail all over the country. Peninsular India has the characteristics of a tropical climate. The temperature is uniformly high and its seasonal variations relatively low.

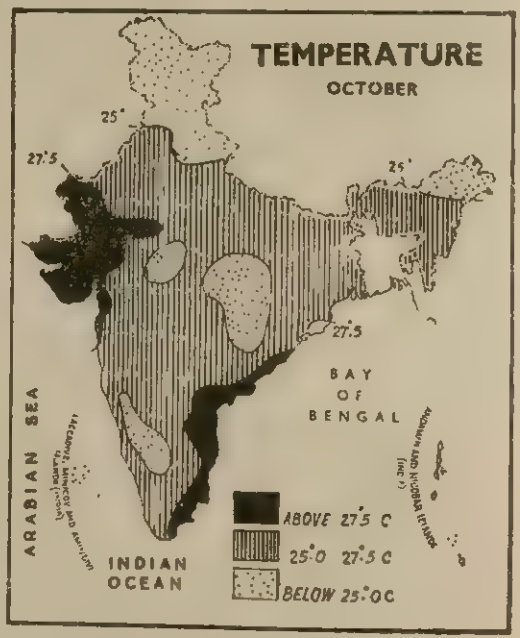
Northern India lies beyond the Tropic of Cancer. In this region climatic conditions show no general similarity. The western side is very hot in summer and very cold in winter. Air is generally devoid of moisture. But on the eastern side, winter is mild and summer is hot with plenty of moisture in the air. The western side includes East Punjab and Rajasthan. The eastern side embraces West Bengal, Assam, Bihar and U.P.

These climatic conditions of the Peninsular and northern India are disturbed by the monsoon winds. The word "monsoon" comes from the Arabic word "*Mausim*" (meaning season) and in India monsoon means the rainy season. There are two Monsoon currents—the South-West Monsoon and the North-East Monsoon. The South-West Monsoon, blowing in-shore, carries with it particles of water and gives rain from June to September. The South-West Monsoon contributes nearly 90 per cent of the total rainfall in India and reaches









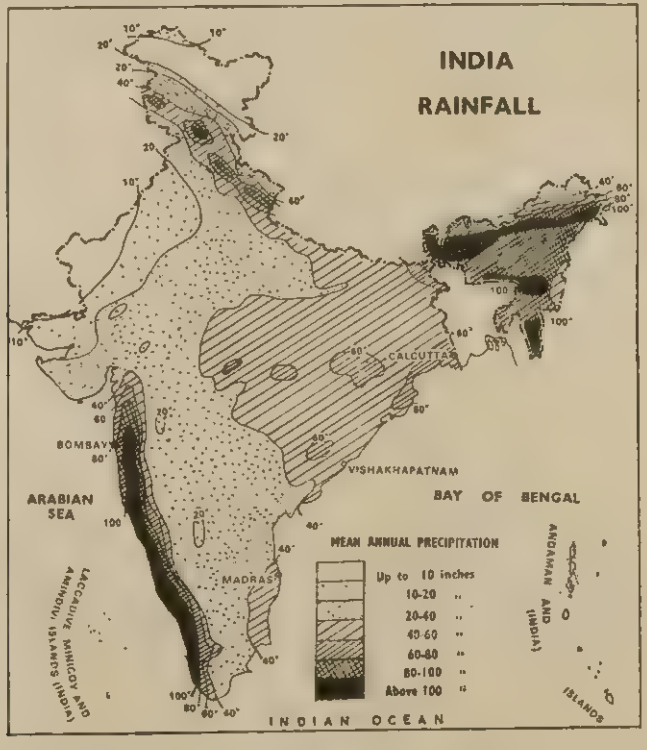
The demarcation of the Gujara-tWest Pakistan Boundary is in accordance with the Indo-Pakistan Western Boundary case, Tribunal Award is in progress (1969).

the country in two currents—the Arabian Sea current and the Bay of Bengal current.

The Bay of Bengal Monsoon current, after being obstructed by the Arakan Mountains and the Shillong plateau on the east, and the Himalayas on the north, proceeds westward up the Ganga plain and causes copious rainfall in Assam, West Bengal, Bihar and the U.P. The Arabian Sea Monsoon, after surmounting the Ghats and giving rains to the Deccan and Madhya Pradesh, meets the Bay of Bengal current in West Bengal and Assam. This combined monsoon is responsible for heavy rainfall in Bengal and Assam.

The South-West Monsoon begins to retreat from Northern India in the early part of October, and the retreat becomes complete by mid-December. "This retreat is associated with dry weather in Northern India but with more or less general rain on the coastal districts of Madras and over the Eastern half of the Peninsula".

The North-East wind begins in January and lasts till March. During this period dry winds from the belt of high pressure in Central Asia (from the West Mediterranean to Central Asia, and North-East China) pass eastward to Persia and Northern India and cause light rain in Northern India, particularly in the Punjab plains. This rainfall, though scanty, is very important for the *kharif* crops. Another current of cold winds after crossing the Eastern Himalayas moves towards the Madras Coast and Ceylon, and gives rain to these areas.



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The average annual rainfall in India is 1050 mm., and the variations from this normal rainfall are surprisingly great. The overall departures from the normal are as great as + 300 mm., and — 275 mm. These variations affect the growth and yield of crops adversely.

Since the supply of water is an essential factor in agriculture, the importance of rainfall to India is of the highest order. For water, most agricultural areas depend on the monsoon. A very slight variation in the amount of rainfall may cause a usually well-watered district to produce drought conditions.

One of the chief characteristics of rainfall is its unequal distribution over the country. Some areas always obtain abundant rain, and some never get more than an inch or two per annum, whilst over large areas the rainfall is uncertain. It is not the average rainfall of any area, but the deviation from the normal average and its untimely distribution that may cause disaster. A deficiency in the expected rainfall causes famine, and too much rain ruins the crops, while the early or late arrival of the monsoon may spoil the harvest.

The rainfall is generally certain in West Bengal, Assam, the West Malabar Coast, the Western slopes of the Ghats and the Upper Valley of the Narmada.

U.P., Western and Northern Rajasthan, the Central Rajasthan plateau bordering on the U.P., a large part of the Maharashtra State, the whole of Tamil Nadu (except the actual slopes of the Eastern Ghats), South and West Andhra Pradesh and Mysore and some districts in Bihar and Orissa are areas of uncertain rainfall.

The existence of these extensive areas of uncertain rainfall has been the cause of India's famines.

It is not possible to control rainfall. Various measures are therefore taken to reduce the possibilities of famines. Chief among these are promotion of railways, extension of irrigation, reclamation of waste-land and agricultural improvements such as cultivation of proper crops and introduction of a scientific system of rotation of crops.

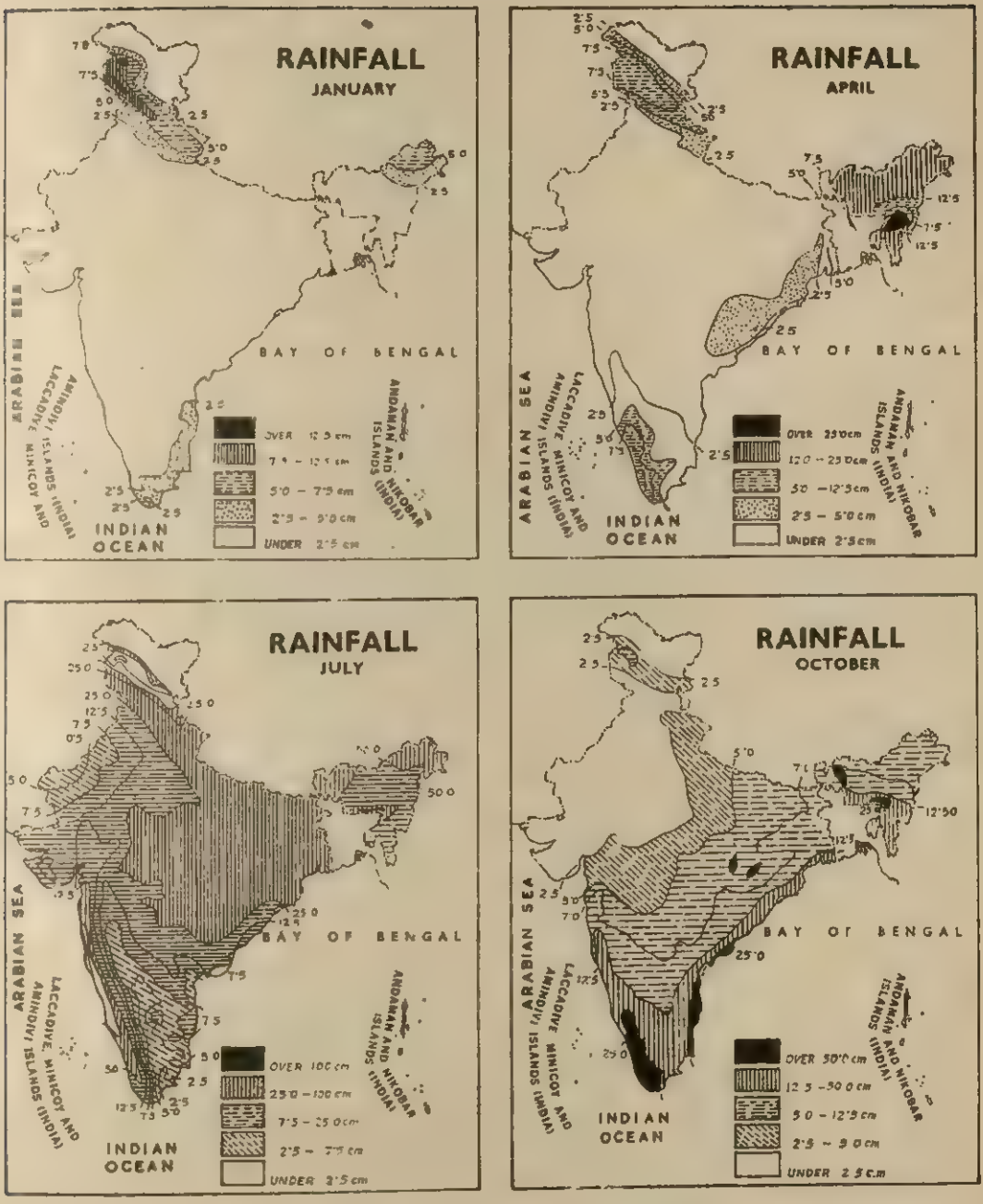
Soils and Soil Regions

A productive soil is the most important factor in successful agriculture. Soils differ in their capacity to produce crops. Some are fit for profitable agriculture, others are impoverished by soil-depleting practices; and still others are poor to start with but made fertile by efficient management.

Soils are seldom uniform over any large area and many kinds of soils may occur even in a small area. Often a number of different kinds of soils occur in association with a more or less definite pattern.

Agriculturally the most important soils are the alluvial ones which occupy extensive tracts of land and include the greater part of Gujarat, Rajasthan, the Punjab, Haryana, U.P., West Bengal, Godavari, Krishna and Thanjavur districts in the South and Assam. The Eastern and Western coastal lands of the Deccan are lowlands of alluvial formations. The alluvial soils are rich in chemical properties and are capable of yielding a large variety of *rabi* and *kharif* crops.

The black soils comprise the greater part of Maharashtra, the whole of Berar, the western part of the Madhya Pradesh and the western part of Andhra Pradesh. The soils of this region vary in different parts in character and productiveness. The soils are poor, thin and porous on the slopes and the uplands of the Deccan hills where millets and pulses are the main crops. In the lowlands, the soils are deeper and darker-coloured, suitable for wheat, millets and cotton. The most important soil in the Deccan trap area is the *regur* or black cotton soil, found mainly in the valleys of the Tapti, the Godavari, the Narmada and the Krishna and parts of



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Kathiawar, Madhya Pradesh and in some parts of Gujarat. Cotton, jowar, wheat, linseed and gram are cultivated in these areas.

Red soils comprise the whole of Tamil Nadu, Mysore, and South-east Maharashtra and extend through the east of Andhra Pradesh and Madhya Pradesh to Orissa and Chota Nagpur. It is also found in the Santal Parganas and the Birbhum district of West Bengal, Mirzapur, Jhansi and Hamirpur districts of U.P., Madhya Pradesh and Eastern Rajasthan. The poor, sandy and light-coloured soils of the arid uplands yield only bajra, while the rich, deep, bright-red fertile loam of the plains produces a wide range of excellent crops. Although the red soil tracts are drained by the Mahanadi, the Godavari, the Krishna and the Cauvery, the use of water by means of canals for irrigation is absent because of the uneven surface except at the deltas. The construction of wells is difficult because of the rocky nature of the surface. The red soil areas are, however, admirably suited for storage of rain water in tanks. In Tamil Nadu, Mysore and Western Andhra Pradesh, cultivation is carried on with the help of tank irrigation.

The laterite soil is found in Madhya Pradesh, Assam and along the Western and Eastern Ghats. The soils are formed by the weathering of laterite rocks. The soils contain acid and favour the cultivation of tea plants. The laterite soil differs widely from one region to another. Generally speaking, they are poor on the higher levels and cannot retain moisture. In the plains, however, they consist of heavy loams and clays and can easily retain moisture.

Mountain and hill soils are suitable for the growth of forests in the hilly parts of the north and specially Darjeeling, Almora and Garhwal districts. Therai soils are covered by tall grasses and shrubs of no agricultural value. These are found in a narrow strip in the Uttar Pradesh and Bihar between plains and hills including Naini Tal, Pilibhit, Kheri, Gonda, Basti and Gorakhpur. Arid and desert soils are found in Rajasthan and mostly contain sands, often with high soluble salt contents. These soils have very low organic matter. Certain parts of Kerala contain peaty and other organic matter. Sub-montane soil is confined to the whole of Simla, most of Kangra and part of Gurdaspur districts.

Questions and Discussion Topics

1. *Is India's location favourable for International Commerce? Why?*
2. *"India possesses few ports and harbours in proportion to her coast line". Give your reasons.*
3. *Describe the climate, products and industries of the three major Natural Regions of India.*
4. *Discuss the importance of rainfall to Indian agriculture. What measures have been taken in India to reduce the possibilities of famine from the vagaries of the monsoon?*
5. *What are the characteristics of Indian soils?*

Chapter 2

Population

Distribution of Population

The study of Economic and Commercial Geography centres round man. Economic activities are significant because they are related to human efforts and their powers. The physical and mental abilities of people are the basis of human power. People with high qualities of the body and mind form a vital part of the resources of a country and the size growth and distribution of population influence its trade and industry. No society can develop its material life without the presence of a sizeable population. The population must grow at a rate to permit full utilization of resources. Moreover the geographical distribution of population should be in keeping with the need for developing the natural resources of every region. A low density of population is not congenial to the development of industry and trade. On the other hand, a high density of population cannot achieve material progress unless there is adequate development of natural and other resources.

The total population of India is 439 million (1961). It has been growing very rapidly in recent times. The average rate of population growth between 1941 and 1951 was 1.25 per cent per annum. It increased to 2.2 per cent per annum during 1951 to 1961. If this rate continues India will have a population of 492 million in 1966, 555 million in 1971 and 625 million in 1976.

The State-wise distribution of population is given in the following table:

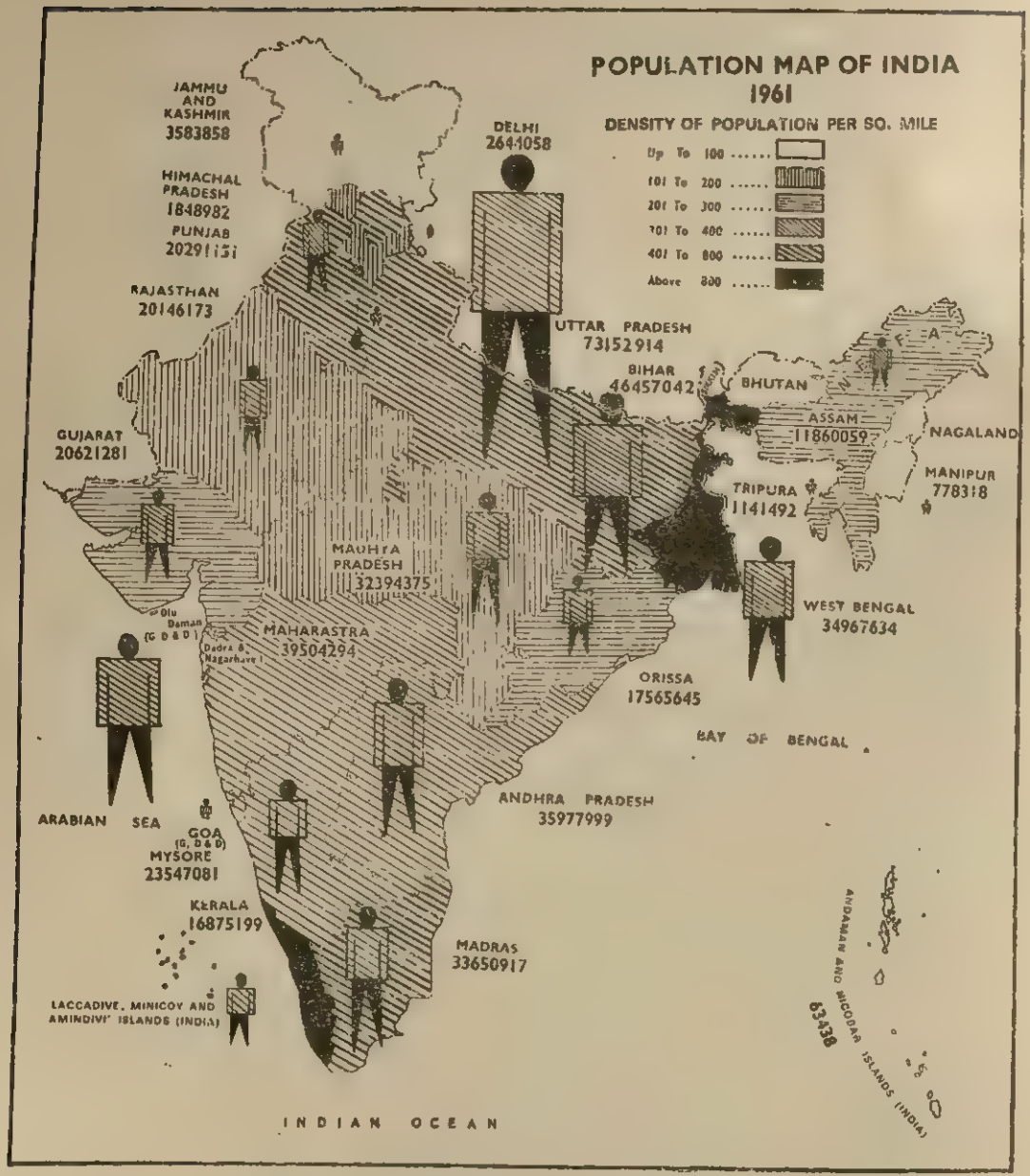
State	*Population 1961 (Millions)*	*Density of population per sq. km.*
Andhra Pradesh ..	36	131
Assam	12	60
Bihar	46	267
Gujarat	21	110
Jammu & Kashmir ..	3.6	26
Kerala	17	435
Madhya Pradesh ..	32	73
Tamil Nadu	34	258
Maharashtra	40	129
Mysore	24	123
Nagaland	0.4	22
Orissa	18	113
Punjab & Haryana ..	20	116
Rajasthan	20	59
U.P.	74	251
West Bengal	35	399
All-India	439	138

Density

The average density of population in India is 138 per square km but it varies widely from one part of the country to another, being as low as 22 in Nagaland and as high as 435 in Kerala. The density of population per square km of arable land is about 235. This indicates a high pressure of population on agricultural land.

Factors Influencing Density

The distribution of population in India has been influenced largely by the geographical and economic conditions or the external environment of particular regions. The density is relatively higher in those areas where the rainfall is heavy and certain,



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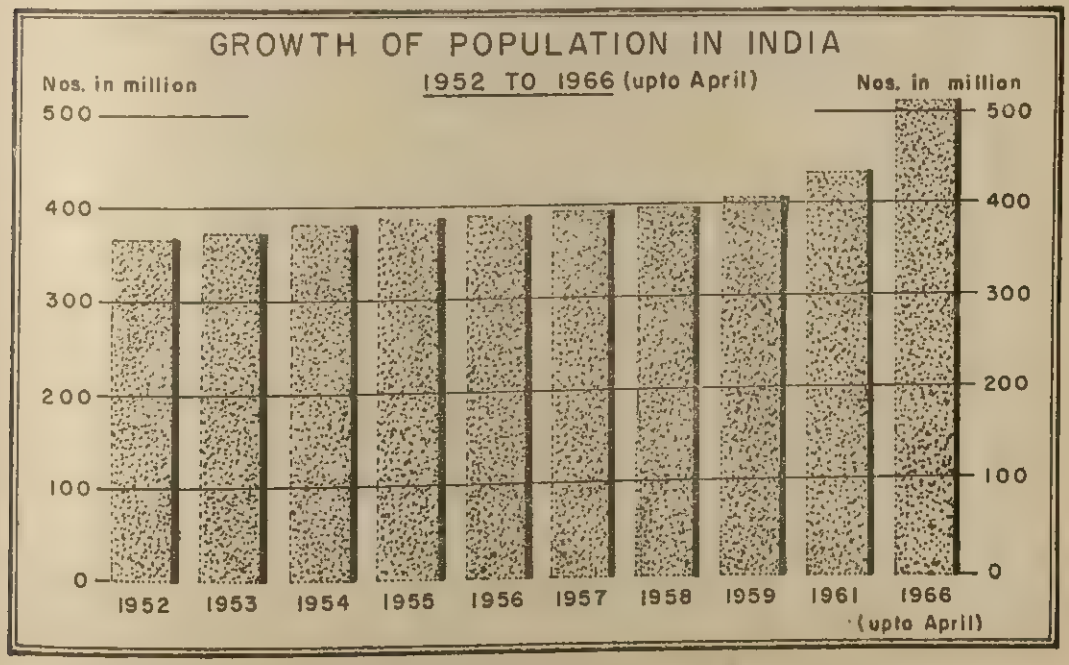
e.g., the Lower Gangetic Plains, Malabar and Konkan coasts, Southern and Coastal districts of Madras and Orissa. The average density in these regions is 275 per square km. These areas also possess level and land fertile soil suitable for the development of agriculture. However there are other areas which inspite of scanty rainfall, support a large population with the help of irrigation. Western U.P. and the Punjab and Haryana are examples of such areas. Mountains, hills and deserts are inhospitable for human settlement. These areas have low densities of population, the average density being 60 per square km in Rajasthan, Western and Eastern Himalayas, Central Indian hills and Eastern Plateaus and hills.

Nearly 82 per cent of the people in India live in villages. This is because agriculture is the mainstay of the large majority of people. The Punjab, Haryana, Upper and Lower Ganga basin, and the Eastern, Western, and South-Eastern plains are the important agricultural areas in India and these are also the most densely populated parts of the country.

The rapid growth of population and the dependence of the majority of people on agriculture are responsible for keeping down the national income of India at a low level. The yield of agricultural crops is low and man-land ratio (i.e., the density of population in the areas available for cultivation) is high. Industrial employment is growing at a very slow rate. The problem of increasing population has been solved in many other countries by a redistribution of population over space and occupations. A part of the population has emigrated and settled in foreign lands. Some part of the population has been settled within the country by reclamation of waste-lands. But more important than these, many people have found new occupations through better utilisation of the economic resources, growth of manufactures and expansion of trade and commerce.

Pressure of Population

The pressure of population in India cannot be lessened by encouraging emigration of Indians to other countries. No



country will allow unrestricted flow of immigrants for a long period of time. There are about 4 million Indians settled outside India. About 3 million of them are in Burma, Ceylon and Malaysia. The rest are mainly settled in Mauritius, Kenya, Uganda, Tanjania, Trinidad, British Guiana and Fiji Islands. Of late, many persons of Indian origin who migrated earlier are returning due to increasing hostility in these countries towards immigrants from India.

Within the country, migration of people from one State to another and from rural to urban areas has been continuing for a long time. A large number of people from Bihar, Orissa, U.P. and Madhya Pradesh have settled in Assam (Tea plantations) and in the industrial areas of West Bengal and Maharashtra. The proportion of urban population has increased from 11.2 per cent in 1921 to 18 per cent in 1961. This gives a rough idea of the rate of increase of industrial employment in the country. But urban employment opportunities are not growing as fast as the increasing population. Hence, the main objectives of the Five Year Development Plans are (i) to raise agricultural production and (ii) to increase industrial capacity.

Characteristics of Indian Population

The people of India are intelligent and enterprising. The past records of the Indian people in arts, science, philosophy, industry and commerce are full of glorious achievements. Although political instability and foreign domination put a brake on the progress of the country for long, the people are once again showing their inherent qualities. India has become the world's biggest secular democracy. The people in India live in peace and unity inspite of the differences in race, religion and language. Scientific knowledge and technical education are being used for the improvement of conditions in agriculture, industry and commerce. The Five Year Plans which have been launched since 1951 aim at increasing both agricultural and industrial capacity, through man-power development. Problems like illiteracy, high death rate, low standard of living, and prevalence of diseases are being tackled to make our human resources more effective for a many-sided development.

Languages in India

There are 826 languages in India of which 116 languages are spoken by about one per cent of the population. More than 380 million people speak one of the fourteen major languages. These major languages are Punjabi, Hindi, Marathi, Urdu, Sanskrit, Gujarati, Assamese, Bengali, Oriya, Kashmiri, Tamil, Telugu, Kannada and Malayalam.* Bihari and Rajasthani are two other important languages. Although English is still one of the official languages of India and also the medium of instruction at college level in most universities, it is not the language of any particular region.

Language Distribution

State	*Language*
Jammu & Kashmir	Dogri & Kashmiri
The Punjab & Haryana	Punjabi & Hindi
Rajasthan	Rajasthani & Hindi
Uttar Pradesh	Hindi
Madhya Pradesh	Hindi
Maharashtra	Marathi
Gujarat	Gujarati
Mysore	Kannada
Kerala	Malayalam
Tamil Nadu	Tamil
Andhra Pradesh	Telugu
Orissa	Oriya
Bihar	Bihari & Hindi
West Bengal	Bengali
Assam	Assamese & Bengali

Tamil, Telugu, Malayalam and Kannada are spoken by about 80 million people while 300 million people speak Punjabi, Hindi, Gujarati, Marathi, Bengali, Assamese, Oriya and Kashmiri.

* Sindhi has been recently included as a language in the schedule VIII of the Constitution.

Hindi has been declared as the official language of the country and will gradually take the place of English. Yet the regional languages function as medium of instruction in different regions.

The multiplicity of languages is no bar to nationhood. Some important States like Canada, South Africa, Spain, Czechoslovakia, Switzerland, China, Soviet Russia, the States of South America and Belgium have many languages; some of them having two or three court languages.

Also, in India one can travel throughout Northern India and a good part of the Deccan with a little knowledge of Hindi. Both Hindi and Urdu are identical in points of grammar and syntax and can be regarded as really one speech, split into two by two totally different scripts. Hindi is written in Devanagari script while Urdu is in Persian-Arabic script.

Questions and Discussion Topics

1. *What geographical factors have influenced the distribution of population in India?*
2. *What are your suggestions for reducing the pressure of increasing population in India?*
3. *How would you make human resources in India more effective in their abilities to bring about developments in various directions?*
4. *Account for the highest density of population in the Gangetic Valley.*
5. *"The pressure of population in India cannot be solved by encouraging emigration of Indians to other countries." Why?*

Chapter 3

Agriculture

India is essentially an agricultural country. For centuries agriculture has been the main source of sustenance for the majority of the population. In no other country except China have so many been living on land for so long. Even today no less than 70 per cent of the people in India are immediately dependent on land for their living. And perhaps another 15 per cent, if not more depend indirectly for their livelihood upon the same source. Besides, some of the major industries such as the cotton and jute textiles and sugar depend entirely on agriculture for the supply of raw materials, and these industries provide a large proportion of the country's exports. It is not therefore surprising that agriculture and allied activities should account for nearly one half of the country's national income.

Land Utilization

Of the total area of the Indian Republic, the land available for cultivation is about 145 million hectares which is roughly 40 per cent of the total land. The land available for cultivation per capita of population comes to 0.5 hectare.

In total area under cultivation, India thus occupies the third place in the world next to the U.S.A. and the U.S.S.R.

Types of Agriculture

Geographical Factors: Although several factors are relevant in the development of agriculture in India, more pronounced are the monsoon, the soils and the plains. It is primarily the monsoon which decides the agricultural seasons, the areas to be cultivated and the crops to be raised. So dependent is agriculture on the monsoon that a little disturbance in its arrival or quantity of rain will invariably upset the agricultural operations. The plains which are drained by rivers are the most important agricultural tracts in India. The great advantage is the accumulation of silt from floods. This fact is also a disadvantage inasmuch as the floods cause loss of crops and property. The plains of India are noted for the cultivation of food crops. The different types of soil account for the crop-pattern of India. The concentration of particular crops in certain areas is the result of similarities of soils in such areas.

The geographical factors like mountains and forests offer less opportunities than others for purposes of cultivation. The areas where these factors are noticeable are: (a) Eastern Maharashtra and Eastern Madhya Pradesh where high lands have still remained uncultivable; (b) Assam where dense forests and mountains restrict cultivation to definite areas; and (c) the Himalayas where mountains prevent large-scale cultivation.

Agricultural Operations

Agricultural operations in India begin in June with the arrival of the monsoon. The crops raised in autumn as a result of the sowing made in June are known as the *Kharif* crops. The principal kharif crops are wheat, rice, millets, maize, tobacco, jute, castor, groundnut, and cotton. The other agricultural season commences in winter,

the products of which are known as the *Rabi* crops. The principal rabi crops are wheat, barley, gram, tobacco, linseed, rape seed and mustard.

Crop Seasons

The seasons and duration of the various crops are shown below:

Crop	*Season*	*Duration (Months)*
Rice	Winter	5½-6
	Autumn	4-4½
	Summer	2-3
Wheat	Rabi	5-5½
Jowar	Kharif	4½-5
	Zaid Kharif	4½
Bajra	Kharif	4-4½
Maize	Kharif	4½
Ragi	Kharif	3½
Barley	Rabi	5-5½
Gram	Rabi	6
Sugarcane	Perennial	10
Sesamum	Rabi	3½-4
Groundnut	Kharif (Early)	4-4½
	(Late)	4½-5
Rape and mustard	Rabi	4
Linseed	Zaid Rabi	5-5½
Castor	Kharif (Early)	6
	(Late)	8
Cotton	Kharif (Early)	6-7
	(Late)	7-8
Tobacco	Kharif	7
Jute	Kharif	6-7

Cropping Methods

When cropping is designed to ensure the production of cereals, fodder, vegetable and cash crops, the system is known as mixed farming. Double-cropping means that a field is replanted with a second crop after the first has been harvested. There may be also multiple-cropping when three harvests are obtained from the same field in the course of a year.

Variety of Crops

The two outstanding features of agricultural production in India are the wide variety of crops and the preponderance of food over non-food crops. The crops are raised for grains, sugar, condiments and spices, oilseeds, fibres, green manures, drug and narcotics, etc. The food crops occupy more than 115 million hectares out of India's total of 155 million hectares under cultivation.

Low Output: Inspite of the fact that 70 per cent of the people in India are engaged in agricultural production, the average yield per hectare in most commodities is one of

Production and Hectarage under Principal Crops

Crops	*Hectarage (Million Hectares)*			*Production (Million Tonnes)*		
	1950-51	1960-61	1964-65	1950-51	1960-61	1964-65
Rice	30.8	33.5	36.00	20.58	34.20	38.73
Wheat	9.7	12.9	13.4	6.46	10.99	12.08
Other Cereals	38	44	45	15.38	23.13	25.21
Pulses	19	23	24	8.41	12.65	12.38
Food Grains	97	113	117	58.83	80.97	88.40
Sugarcane	1.7	2.3	2.5	5.71	10.62	12.32
Oil Seeds	10.7	13.5	14.5	5.16	6.62	8.58
Cotton*	5.8	7.6	8.1	2.88	5.32	5.41
Jute	.6	.6	.8	3.31	4.01	6.08

*In million bales of 180 kg.

the lowest in the world as shown by the following table:

Comparative Yield of Crops per Hectare
(100 kg.: 1963-64)

Countries	*Wheat* 100 *kg./ hectare*	*Rice* 100 *kg./ hectare*	*Cotton* 100 *kg./ hectare*	*Maize* 100 *kg./ hectare*
U.S.A.	17	44·4	5·8	42·2
France	26·6	39·8	..	40·6
Canada	17·6	..	..	41
Australia	13·4	59·1	4·0	19·7
India	7·9	15·4	1·2	10
Japan	12·3	52·4	..	26·7

Reasons for Low Output: The reasons for low output are (i) Lack of assured and timely irrigation water supply, (ii) the low level of soil fertility and the general absence of fertilising practices, (iii) use of low quality seeds, (iv) lack of use of improved implements and equipment, (v) unsound credit system, and (vi) lack of use of improved plant protection methods. Above all the Indian agriculture is often subject to serious dislocation on account of drought or floods.

Another factor responsible for low yield is the small size of holdings. The average farming is carried out on a very small scale. This has forced many cultivators even to abandon farming in despair. The cultivated field per rural family is hardly 3 hectares. Compared with America and some European countries, the hectarage under cultivation is very low, though compared with Japan and U.A.R., the size is fairly high.

Average Size of Holdings per Family
(1963)

Country	*Hectare*	*Country*	*Hectare*
India	2·5	Denmark	15·0
U.K.	22·0	Japan	0·8
U.S.A.	100·0	U.A.R.	0·9
New Zealand	196·0		

But Japan is an exception. Inspite of small holdings, the Japanese have been able to get very high yields per hectare through intensive methods of cultivation and increasing use of fertilizers. The limitations inherent in small holdings are no doubt serious but with improvements in farm techniques and management through fertilizers and better seeds, even a small holding can give more yields per hectare. The present size of unit per family in India is in any case too small to provide a living for all the members of a family.

However, in an effort to solve the problem of small holdings, the idea of co-operative farming is also being encouraged, and joint co-operative farming societies are being established. But the progress of co-operative farming will eventually depend on voluntary co-operation and efficient management at the village level. Besides, the size of each co-operative farm should be such as to make for economic operation and secure proper development of the village economy as a whole.

Waste Land: India has 35 million hectares of barren and ravine lands which are not being put to any use and are lying as culturable waste. Rajasthan has about seven million hectares of culturable waste, followed by Madhya Pradesh, Andhra Pradesh, U.P. and Orissa with 6.8, 3.4, 1.8 and 1.7 million hectares, respectively. At least four million hectares out of this area can be made cultivable with proper care and organisational efforts.

Agricultural production in India can, however, be raised by reclamation of waste land, increased supply of water through irrigation, use of good seeds, use of chemical manures, use of machinery to bring new or difficult land under cultivation, by anti-malaria measures to improve the health of peasants and by offering credit and other facilities to the cultivators.

Systematic efforts are already being made to increase agricultural production in India. The following table gives an indication of the yield increase per hectare of certain important crops:

Average Yield of Principal Crops
100 Kg./Hectare

Crops	1948-49	1961-62	1962-63	1963-64
Rice	11·1	15·2	13·7	15·4
Wheat	6·6	8·5	8·9	7·9
Millets	3·8	4·3	5·3	5·1
Sugarcane (gur)	33·4	41·9	40·9	N.A.
Cotton*	0·9	1·3	1·2	N.A.
Jute*	10·4	11·8	12·5	N.A.
Ground-nut**	7·3	7·3	7·0	7·8
Maize	6·3	9·5	9·9	10·0

* In terms of quintals.
** Nuts in shells.
N.A. Not Available.

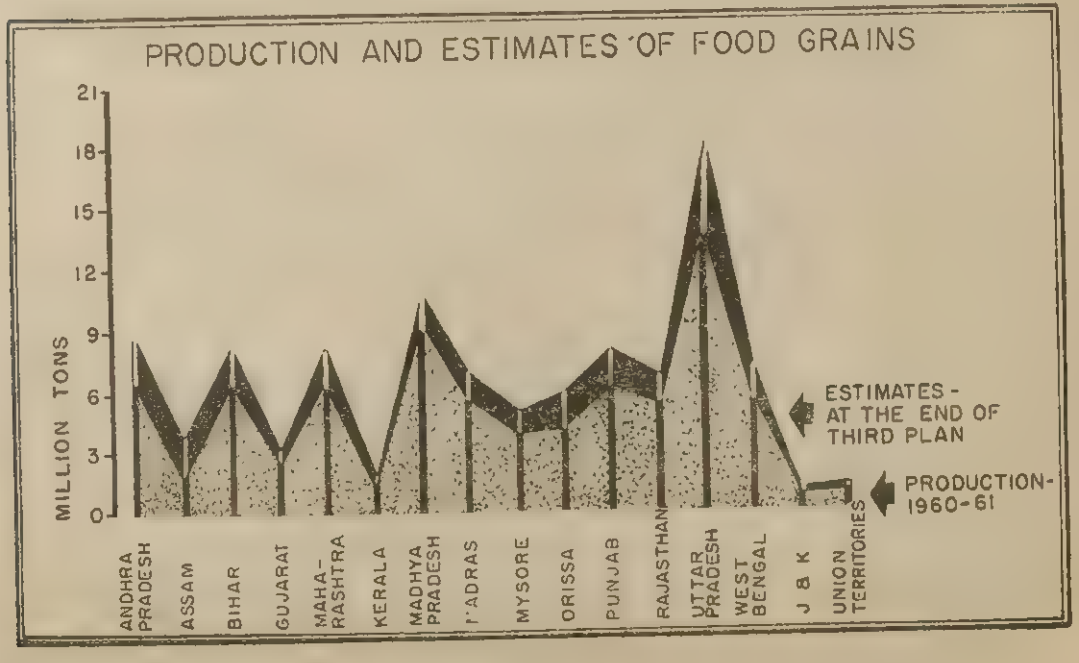
Evidently this increase in yield has been possible through clearance and reclamation of wastelands, mechanical cultivation, chemical fertilisers, improved and high quality seeds, and irrigation schemes. It may be noted that of the total area of 156 million hectares under cultivation in 1961-62, 25 millions hectares were served by irrigation as against 20.9 million hectares in 1950-51.

Area Under Irrigation (By Sources)
(Million Hectares)

Source	1950-51	1961-62	1962-63
Canals	8·3	10·5	10·9
Tanks	3·6	4·4	4·7
Wells	6·0	7·3	7·7
Other Sources	3·0	2·4	2·4
Total	20·9	24·6	25·7

Food Production and the Five Year Plans

Food crops like rice, wheat, inferior cereals and pulses occupy about 86 per cent of the total hectarage under crops in India. Although India is one of the biggest agricultural countries of the world, her position with regard to food production continues to be unsatisfactory.



Food shortage in India is essentially due to the failure of agriculture in raising its productivity. The population of India has increased by 21.64 per cent in 1961 from what it was in 1951. This rate of growth of population is continuing, necessitating a continuous increase in food production. Again, lean years and crop failures make it imperative to create a surplus and to carry it over as stock. The Five Year Plans have, therefore, laid great emphasis on the agricultural sector of our economy in order to "achieve self-sufficiency in food grains and increase agricultural production to meet the requirements of industry and export." India's annual increase in food production is 3.2 per cent (from 1953 to 1959), which if the gap between the needs for food grains and supply is to be made narrower, must be raised to 8.2 per cent per year for the next seven years. The food production in 1965-66 was 72.3 million tonnes as against the requirement of about 90 million tonnes. The low production has, therefore, led to a crisis in food supply. The Fourth Plan envisages a production of 120 million tonnes of food grains by 1970-71.

Total Foodgrains Production

	(Million Tonnes)
1949-50	54·92
1950-51	50·83
1955-56	66·85
1960-61	80·97
1963-64	79·43
1965-66	72·30

Food Shortage: Imported food continues to play an important role in meeting India's deficit. Cereals are imported largely under agreements from the U.S.A., Burma, South Vietnam, U.A.R., Canada, Australia and Thailand. India has entered into agreements with the U.S.A. under PL-480 to buy food grains. PL-480 permits the U.S.A. to supply their surplus grains and to accept payment in rupees. This Act also permits the U.S.A. to use the proceeds in India for different projects.

The following table shows the import of cereals into India from 1961-65:

Import of Cereals

(In thousand metric tonnes)

Year	*Rice*	*Wheat & Wheat Flour*	*Other Cereals*	*Total*
1961	3,84	3,092	19	3,495
1962	3,90	3,250	..	3,640
1963	4,83	4,073	..	4,556
1964	6,45	5,621	..	6,266
1965	7,83	6,583	96	7,462

Measures for Improving Food Position

The Government has taken various measures to arrest the rising prices of foodgrains and to facilitate better distribution of foodgrains. In 1965, the Food Corporation of India was established as an autonomous organisation to undertake purchase, storage, movement, transport, distribution and sale of food grains and other food stuffs. The Corporation has already started functioning in Madras, Kerala, Mysore and Andhra Pradesh. The Agricultural Price Commission has been set up to advise the government on agricultural price policy and price structure of agricultural commodities. Steps have been taken to introduce rationing in big cities and towns to cope with the present acute shortage.

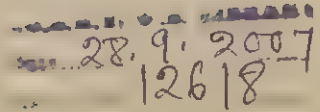
Production of Subsdiary Foods: As part of the programme to achieve self-sufficiency in the matter of food, it is also necessary to encourage changes in food habits and also to pay greater attention to subsidiary foods like bananas, tapioca, groundnuts and sweet potatoes. The 4.5 million tonnes of groundnut produced in India can yield 3 million tonnes of finest food equivalent in protein value to over 10,900 million litres of milk. Tapioca as a stable diet is unsatisfactory because of its deficiency in the quantity and possibly in the quality of its proteins. Never-

theless, there is a tendency in Tamil Nadu and Kerala to foster consumption of tapioca at the expense of other foods, such as rice which is undesirable from the standpoint of nutrition.

The total hectarage under tapioca is about 250,000 hectares of which 2,00,000 hectares are in Kerala and the rest in Tamil Nadu. Tapioca's popularity appears to be based on its high yield of about 7 to 12 tonnes per hectare which with careful cultivation can be raised to 35 tonnes per hectare. .Also it can thrive in relatively dry weather. Sufficient attention has not been paid so far to banana cultivation both for internal consumption and foreign markets. Not only is this article consumed throughout the country, its demand in foreign markets is considerable. The question of subsidiary food should, therefore, receive serious attention from the point of view of improving nutrition and making for a better balanced diet. The use of non-cereal food will not only reduce the demand for cereals but will also release land for the production of other foods.

Questions and Discussion Topics

1. *Describe the geographical factors that are relevant in the development of agriculture in India.*
2. *What are the causes of low agricultural output in India ?*
3. *Account for the agricultural food shortage in India. How can India achieve self-sufficiency in food ?*
4. *What are the principal cropping methods in India ?*



Chapter 4

Some Important Agricultural Crops

The agricultural crops in India can be divided into two broad categories: (a) Food crops and (b) Non-food crops. The principal food crops are rice, wheat, millets, barley, maize, pulses, and sugarcane. Tea and coffee are beverage crops and tobacco belongs to nicotine group, but they are included in this category to distinguish them from the non-food crops.

Food Crops

Rice

As the staple food of the people in many parts of the country, rice is the most important crop in India. With about 36 million hectares of land, rice covers nearly 30 per cent of the sown area. Among the rice-producing countries of the world, India continues to retain the second place after China.

Rice is a special crop of the monsoon lands where it finds almost ideal conditions for its growth. High temperature, heavy rainfall, and fertile alluvial plains, make a combination which is seldom met with in any other region of the world. The greatest areas under rice cultivation are found in river deltas, in low lying coastal districts, and in tracts subject to floods during the monsoon.

Rice-growing States: Thus, the principal rice-growing areas of India are: West Bengal, Andhra Pradesh, Bihar, Tamil Nadu, Uttar Pradesh and Orissa. These areas account for about 95 per cent of the total rice hectarage in India.

Production of Rice: State-Wise

State	Production (Thousand Tonnes) 1955-56	1960-61	1964-65*
Andhra Pradesh	3,100	3,500	4,610
Assam	1,690	1,705	1,910
Bihar	3,420	4,000	4,990
Maharashtra	—	1,506	1,470
Madhya Pradesh	2,920	3,146	3,430
Tamil Nadu	3,010	3,103	4,050
Orissa	2,120	2,138	4,420
Uttar Pradesh	2,590	2,400	3,310
West Bengal	4,520	4,500	5,760
Total	27,560	31,512	38,730

* Estimates

Increase in Production: At the time of independence rice covered only 22 per cent of the cropped area. From the inception of the First Plan period, however, production of rice has been on the increase. In 1964-65 production was 39 million tonnes compared to 28 million tonnes in 1955-56. The hectarage under rice has also increased from about 30 million hectares to 36 million hectares between 1950-51 and 1964-65.

Rice-growing Seasons: The yield of rice per hectare is influenced by a number of factors, such as rainfall, irrigation and soil, which are liable to vary from place to place. It also varies according to seasons. Summer rice generally gives the largest yield and autumn, the smallest. Roughly there are three rice growing seasons. Except West Bengal, Bihar and Kerala, the other States do not grow rice in all the three seasons. The following table gives the time of sowing and harvesting of rice as practised in different regions:

Region	Winter Rice		Autumn Rice		Summer Rice	
	Sowing	Harvesting	Sowing	Harvesting	Sowing	Harvesting
Bengal	May July	October January	March July	June September	October January	February April
Bihar	June August	November December	May July	August October	September November	February March
Tamil Nadu	June October	December March	.. ..	.. ..	December March	April May
The Punjab and Haryana	March August	September November	.. ..	.. ..	.. .	. ..
U.P.	June August	September December	.. ..	.. ..	.. ..	.. ..
Gujarat	May August	December January	. ..	.. ..	.. ..	.. ..
Kashmir	.. ..	.. ..	April May	September October	. ..	.. ..
Mysore	June July	November December	.. ..	.. October	February ..	April May
Madhya Pradesh ..	June July	November December	June July	.. ..	.. ..	.. ..
Kerala	September October	January February	April May	September October	January February	April May
Andhra Pradesh	June July	November December	.. ..	.. ..	November January	April May

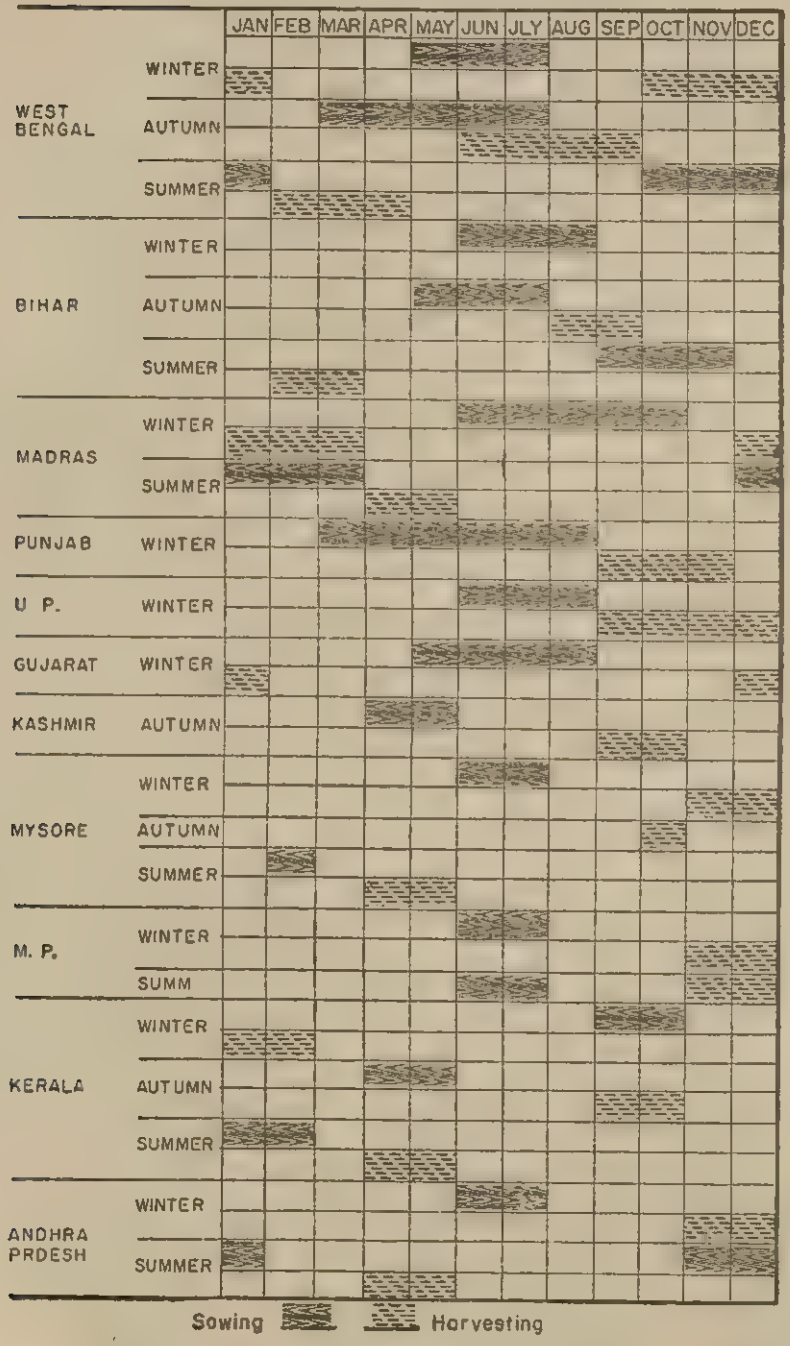
Rice-sowing Methods: Rice is sown in India in three ways—by broadcast, by drill and by transplantation from a seed bed. The first method is practised where labour is scarce and the soil infertile. The second method is mostly confined to Peninsular India. The third method is common but it requires plentiful supply of labour, because the seed-beds are to be highly manured before the seeds are sown. After four to five weeks, the seedlings are uprooted, tied into bundles and carried to the field where they are again planted by hand. The transplanting of the young plants from seed-beds to fields, cutting the rice with sickle and the husking of the grain all involve much manual labour.

Yield Per Hectare: West Bengal has the highest yield of rice per hectare. Almost in every district of West Bengal rice accounts for more than 60 per cent of the sown area. About 4 million hectares of land are under rice cultivation in West Bengal with approximately 5.6 million tonnes of rice as annual yield. Other areas where rice crop covers over 80 per cent of the sown area are Cuttack, Puri and Sambalpur in Orissa, Kamrup and Goalpara in Assam and West Godavari, Chingleput, Thanjavur and Kanara in the Southern States.

The average yield per hectare in 1963-64 was 1,029 kg. Although the yield is much higher than what it was in 1950-51 with 771 kg per hectare, it is still far below that of the U.S.A., the U.A.R., Italy and Japan where the yields are more than 3,000 kg per hectare.

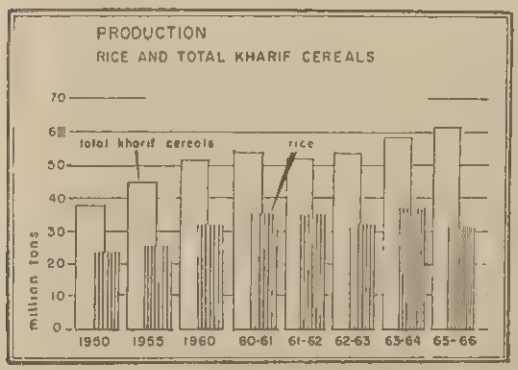
Marketable Surplus and Shortage: It so happens that only about 30 per cent of the rice produced in India is available as marketable surplus, and the rest is consumed in the growing areas. West Bengal has a normal

SOWING AND HARVESTING OF RICE



deficit of 3,00,000 tonnes. Tamil Nadu, Bihar, Gujarat and U.P. have larger deficits but in these States except Tamil Nadu, wheat is the staple food crop. Assam, Madhya Pradesh and Orissa normally have a sizeable marketable surplus.

Thus, even though India has increased her rice production in the course of years since independence, imports of large quantities of rice cannot be dispensed with even now. India imports rice from Burma, Thailand and the U.S.A.



Scope for Increased Production: There is a large scope for further cultivation of rice in India, particularly in West Bengal, Bihar and Orissa. The three multipurpose projects in the Damodar, Kosi and Mahanadi valleys aim at bringing millions of hectares of land under cultivation. Moreover, production of rice can be increased in the country by atleast 50 per cent through improved varieties and better manuring.

The Japanese Method: Lately, experiments and pilot projects have been initiated on the Japanese method of rice cultivation. In Japan, the farmer gets twice or thrice as much as our normal yields. The Japanese method involves the addition of adequate organic manures, application of fertilisers at the proper time and at the proper stage of the growth of the crop, and the labour that the farmers put in by way of interculturing and weeding. More than 2.5 million hectares of land are under Japanese method of rice cultivation.

The chief features of the Japanese method of rice cultivation are: (i) use of less and better seed; (ii) sowing the seed in a raised "nursery" bed; (iii) transplanting the seedlings in rows to make weeding and fertilizing easy; (iv) use of natural and chemical fertilizers—compost, green manure, and ammonium sulphate.

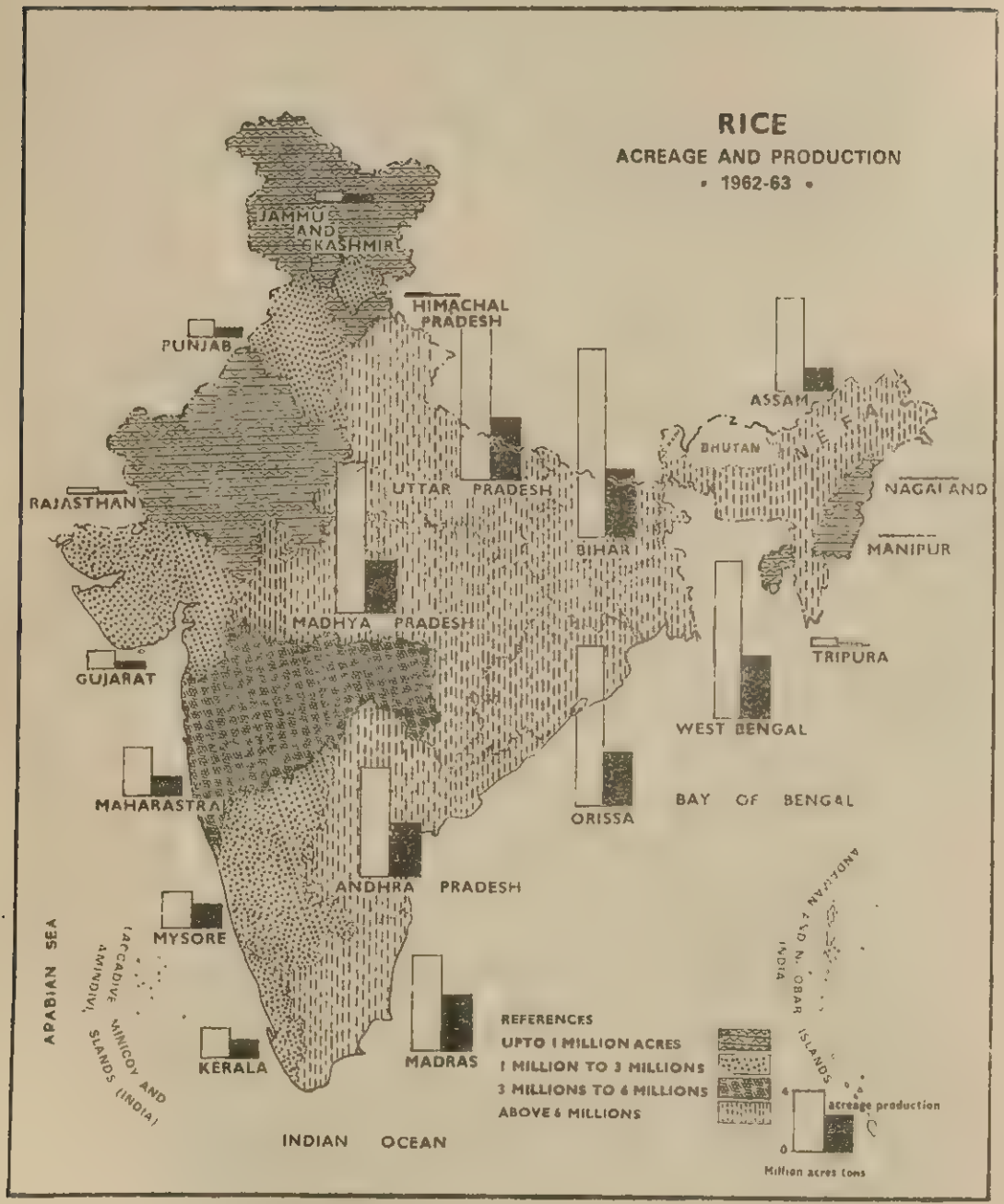
Hybridisation between Japanica and Indica rice is also being worked out at various places, though on a limited scale. It is estimated that if only 3 per cent of India's total irrigated paddy area is cultivated by the Japanese method, India will not need to import rice.

Wheat

Although wheat is the staple food of the people in the Punjab, Haryana and U.P., there is considerable demand for it in other parts of India. Wheat requires a fairly warm temperature, but the period of heat should not be long as grains can ripen quickly. At the growing season, a little rainfall is helpful. In other words, wheat plants will endure dryness in atmosphere provided water supply by means of irrigation is assured.

Wheat-growing Seasons in India: Wheat is grown in two seasons—in winter and spring. The winter wheat requires low temperature in the early stages of its growth and can withstand the winter cold to mature in the summer months. The winter wheat, therefore, takes a longer period to grow. The spring wheat is sown in April and harvested in August. In India, however, most of the wheat is grown in winter.

In the Punjab, Haryana and Western U.P., for example, the bulk of the crop is generally sown by the end of November. In U. P. and Bihar it is usually sown in October or early November, whereas in the Deccan and



The demarcation of the Gujarat-West-Pakistan Boundary is in accordance with the Indo-Pakistan-Western Boundary case. Tribunal Award is in progress (1969).

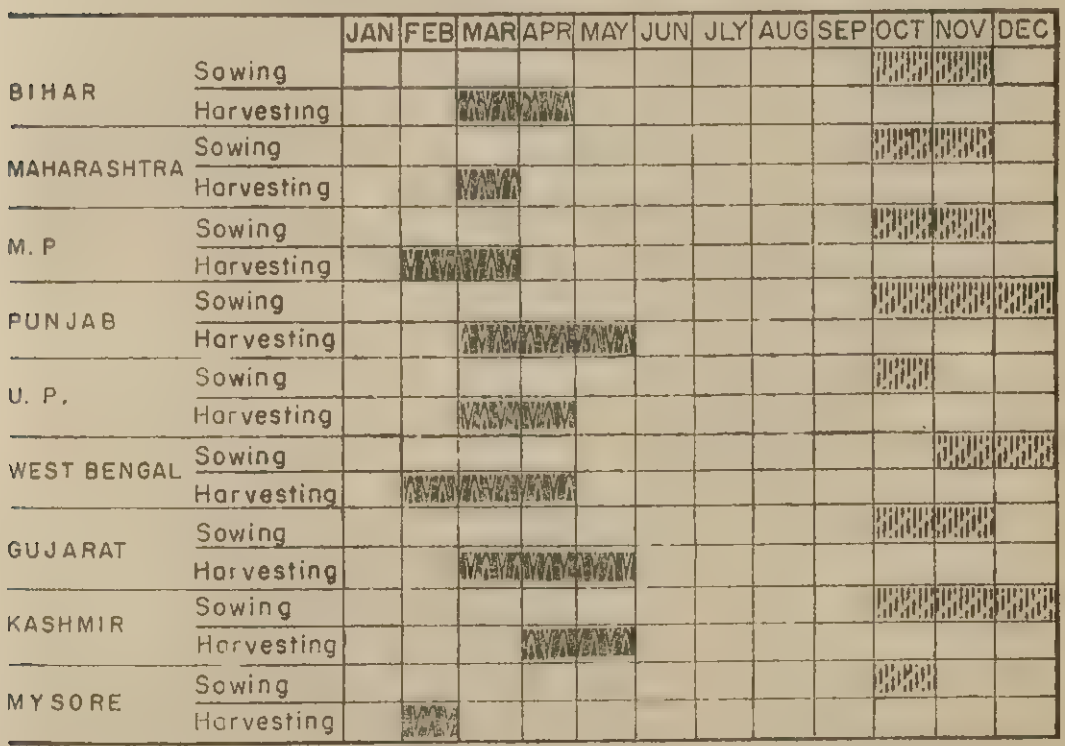
some parts of the Maharashtra State, the crop is sown sometime between September and the middle of October. The sowing and harvesting periods as observed in the different states of India are as follows:

Regions	*Sowing*	*Harvesting*
Bihar	October-November	March-April
Maharashtra	,,	March
Madhya Pradesh	,,	February-March
The Punjab and Haryana	October-December	March-May
U.P.	October	March-April
West Bengal	Nov.-December	February-April
Gujarat	October-November	March-May
Kashmir	October-December	April-May
Mysore	October	February

end of December in the South, while in Madhya Pradesh, it commences normally in March. In Western U.P., Haryana, Delhi and the Punjab, harvesting is normally in full swing by the end of April. In the hilly regions of Northern India, the growing season for wheat is about nine months.

Varieties of Wheat in India: In India there are two principal varieties of wheat: the normal bread wheat and the macaroni wheat. The first type grows as an irrigated crop in the Punjab, Haryana and U.P. and thrives best on soils of the clayey type.

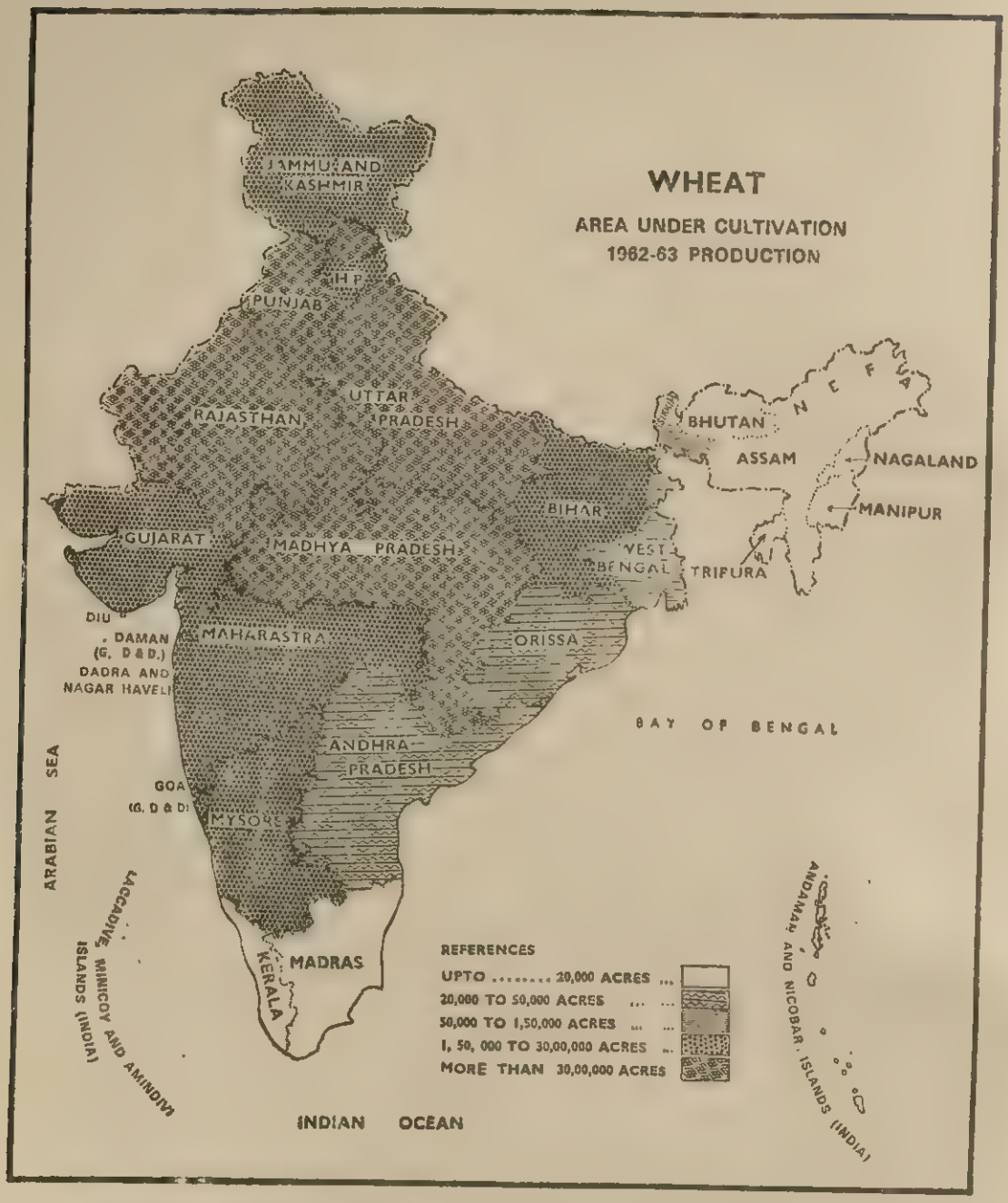
SOWING AND HARVESTING OF WHEAT



From the above it will be observed that wheat in India takes four to six months to ripen as against nine to ten months in some western countries. In the South, however, the growing period is shorter than in the North. The harvesting may begin at the

The second type is grown as a rain-fed crop on the clayey black soil of Maharashtra, Madhya Pradesh and the western part of Andhra Pradesh.

Area and Production: Wheat area covers



(i) Based upon the Survey of India Map with the permission of the Surveyor General of India.
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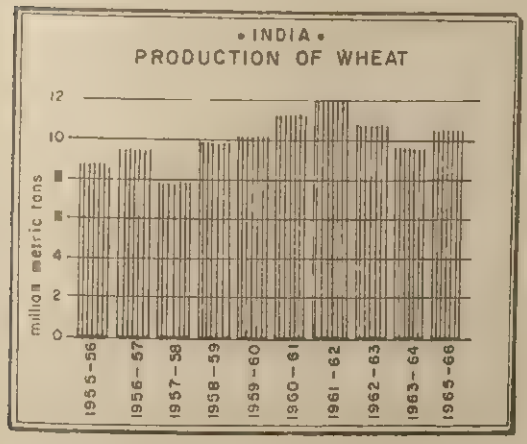
(ii) The spellings of names appearing in this map have been taken from various sources.
(iii) The demarcation of the Gujarat-West-Pakistan Boundary is in accordance with the Indo-Pakistan-Western Boundary case. Tribunal Award is in progress (1969).

about 14 million hectares of land, producing about 12 million tonnes of wheat. Since 1950, the production of wheat has been increasing every year though at a slow rate. The steady increase has, however, been due to the increase in area under crop rather than to any increase in the yield per hectare, though in U.P. the increase in production has been due to some rise in the yield per hectare.

Wheat Production in India

	(in million tonnes)
1950-51	6·3
1955-56	8·6
1960-61	10·8
1961-62	11·8
1962-63	10·9
1963-64	9·7
1964-65	12·1

The largest producer is U.P. with about 30 to 35 per cent of India's production. The Punjab and Haryana with about 50 per cent less average of land under wheat than U.P. raise more than 25 per cent of the country's total.



The State-wise figures of hectarage and production of wheat during 1963-64 are as follows:

State	*Area* (Thousand Hectares)	*Production* (Thousand Tonnes)
Bihar	716	372
Maharashtra	916	343
Madhya Pradesh	3,142	1,875
Punjab and Haryana	2,263	2,782
Rajasthan	1,243	861
Uttar Pradesh	4,039	4,089
Total	13,458	9,708

Yield per Hectare in India and Other Countries: In the case of wheat, particularly, ploughing and sowing, harvesting and threshing call for a large amount of manual labour and that explains why it is cultivated on a large scale mostly in these areas where a sufficient force of labour is available. The average yield of wheat in India and other countries during 1964-65 is given below:

	100 Kg. per Hectare
Netherlands	47·1
Belgium	42
Germany (W)	36
France	32
Italy	20
U.S.A.	18
Australia	14
India	7·3

The production of wheat in India is often subject to fluctuations because of the rotation of crops. Within the country, however, there are variations in the yield per hectare.

The average yield of wheat in the different States in India during 1962-63 as in terms of quintals per hectare is as follows:

Uttar Pradesh	8	Andhra	2·7
Madhya Pradesh	6·7	Assam	7·6
Bihar	7·4	M.P.	6·7
Maharashtra	5·1	Mysore	2·7
Rajasthan	8·7	Orissa	4·4
The Punjab and Haryana	13·5	West Bengal	6·2

All India 8·13

The difference in yield per hectare as noticeable in the case of some States is due to the conditions of water supply. The areas

which are served by irrigation register much higher yield than the areas which depend only on the bounty of rainfall. In the Punjab, Haryana, Western U.P., and Rajasthan the cultivation of wheat depends on irrigation. In Bihar and Western parts of U.P., the wheat crop is solely rain-fed.

Reasons for Low Yield Per Hectare: The average yield of wheat per hectare in India is abnormally low compared with that in the European and American countries, where use of machinery, grain elevators, and better seeds are quite common. With credit facilities and technical services along with measures for soil conservation, the Indian cultivators should be in a position to increase the average yield per hectare. Experiments with newer varieties of wheat like the Mexican variety, which can give very high yields could be taken up with advantage. The Mexican varieties of wheat, for instance, can raise the yield to 40 quintals per hectare instead of 8.13 quintals as at present.

Since Indian cultivators are receptive to new ideas, and since there is scope for increasing the areas under wheat in U.P., Haryana, Rajasthan and the Punjab, production of wheat can be increased substantially in future. The country has yet to become self-sufficient in wheat.

At present, India imports wheat from the U.S.A., Canada, Australia, France and Argentina. In 1964-65, the volume of imported wheat was 6.5 million metric tonnes.

Millets

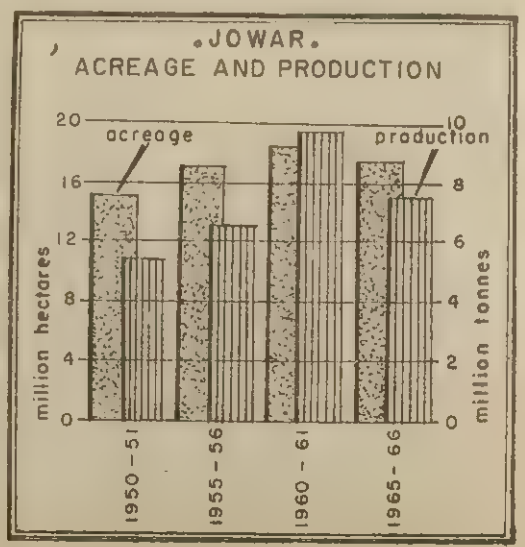
Millets Grow Where Rice Does Not: Millets are grown in those parts of the monsoon lands where rainfall is not sufficient for the cultivation of rice. Also in hot areas with scanty rainfall and in areas where soil is rather infertile owing to its rocky or sandy character, millets are the chief summer grain crop. It is interesting to know that millets replace rice in India, wheat in China, and corn in the U.S.A., as and when the summer rain is scanty, irregular or uncertain.

Millets in India: The name millets is rather carelessly used to denote a number of grains; the varieties in India are jowar, bajra and ragi. Dhurra of America and sorghum of the U.S.A. also belong to the same family. Millets are hardier crops than rice and form the staple food of the people living in the comparatively dry interiors of Africa and Asia.

In India, millets constitute the staple crop in the dry interiors of the Deccan plateau, where it can be grown without irrigation facilities and with as little rainfall as 500 mm. Where the rainfall exceeds 1000 mm, jowar tends to be replaced by wheat or rice.

Jowar

Jowar is extensively cultivated in the Deccan, and also to some extent in other dry parts of India like Madhya Pradesh, and Gujarat. The area under cultivation in 1964-65 was more than 18 million hectares and the yield was 9.8 million tonnes.



Jowar: Production and Hectarage

Year	*Area* (000 Hectares)	*Production* (000 Tonnes)
1950-51	15,571	54·08
1955-56	17,362	66·19
1960-61	17,237	92·15
1961-62	17,798	76·19
1964-65	18,012	98·11

Maharashtra, Mysore, Rajasthan, Gujarat, Jammu and Kashmir, Madhya Pradesh and Andhra Pradesh account for more than 80 per cent of the total area under jowar. Maharashtra produces about 33 per cent of the total production. In Sholapur district of Maharashtra more than 60 per cent of the sown area is under jowar. In Poona and Belgaum districts, the hectarage under jowar accounts for more than 50 per cent of total area. Madhya Pradesh, Andhra Pradesh and Mysore contribute about 3 million tonnes a year, the share of each being one million tonnes.

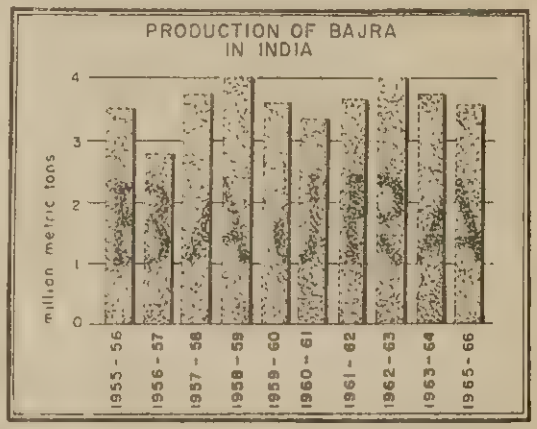
In India, Jowar is of great importance both as food and fodder. The fodder value of the jowar plant is so great that in some parts of the U.P. and the Punjab the crop is raised even with the help of irrigation solely for this purpose. Jowar has nutritive value as a fodder. The average yield of jowar is about 5.3 quintals per hectare.

Bajra

Bajra is a short season crop and is grown generally in poorer soils. It is less widely cultivated. It is essentially a village food crop. Rajasthan, U.P., Gujarat, Andhra Pradesh, the Punjab and Haryana are the principal producers. The area under cultivation is about 11 million hectares and the yield amounts to about 4.5 million tonnes. The average yield is 3.6 quintals per hectare. More than 50 per cent of the total production comes from U.P. and Rajasthan. Maharashtra and Gujarat produce a little more than half a million tonnes each.

Bajra: Hectarage and Production

Year	*Area* (Thousand Hectares)	*Production* (Thousand Tonnes)
1950-51	9,023	25,54
1955-56	11,339	33,74
1960-61	11,425	31,77
1961-62	11,057	34,98
1964-65	11,712	44,65



About one-fourth of the total production of millets is exported to destinations like Sudan, Saudi Arabia, Netherlands, Germany, East Africa, and Aden. More than 90 per cent of the millets are shipped from the Bombay port.

Barley

In ancient times, in many parts of the world specially in the Mediterranean belt barley was the principal bread cereal. That was probably so because barley gives a higher yield than any other grain in the comparatively warm and dry regions of the Mediterranean.

Barley resembles wheat in general appearance and manner of growth, and thrives on scanty moisture supply. If, in any year, rainfall is below normal for wheat cultivation, barley is substituted. Light and sandy soils are ideal for the cultivation of barley. It can be grown even in alkaline soils.

In India, barley is a winter crop. It is sown in October and November. Its harvesting season begins from the third week of March and is over by the middle of April. Thus, barley has a very short period of growth compared to that of wheat or gram. The fluctuating nature in the production of wheat is due to the fact that whenever conditions are unfavourable for gram or wheat, the farmer generally grows barley.

Barley: Hectarage and Production

Year	*Area* (Thousand Hectares)	*Production* (Thousand Tonnes)
1950-51	2,378	23,40
1955-56	2,815	27,71
1960-61	2,866	28,21
1961-62	3,152	31,02
1964-65	2,668	24,78

The average yield per hectare is 8.1 quintals (1962-63). U.P. produces more than 50 per cent of India's total production. The next highest producer is Rajasthan with about 12 per cent of India's production. The other producers are Bihar, the Punjab, Haryana and Madhya Pradesh.

There is a considerable demand for barley, yet its production has come down to about 25 million tonnes in 1964-65 from 31 million tonnes in 1961-62. Unless the production is stabilised, not only will it fail to meet the internal demand, its contribution as a supplier of food crops will also remain unimportant.

Maize

Maize, or corn as it is known in America, is found more or less all over India, but Northern India raises the major portion of it. Like the millets, maize is considered in India to be an inferior grain. It prefers fertile soil, specially loam, and is, therefore, grown mostly in U.P., the Punjab and Haryana. Maize requires high temperature and more rain than wheat. The soil should be rich and well drained. Most of the maize is grown in regions with an annual rainfall of atleast 500 mm.

The total area under maize is 4.5 million hectares with a production of about 4.5 million tonnes a year. The average yield of maize is 9.9 quintals per hectares (1962-63).

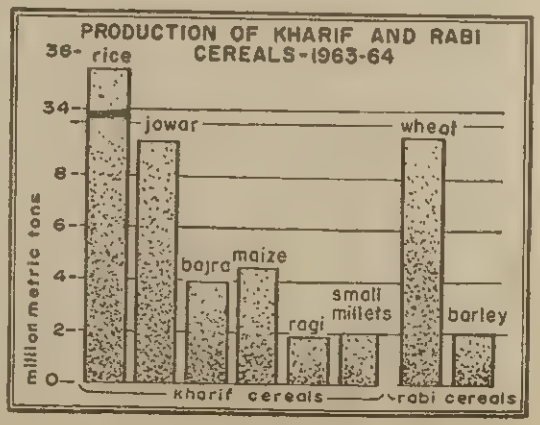
Maize: Hectarage and Production

Year	*Area* (Thousand Hectares)	*Production* (Thousand Tonnes)
1950-51	3,159	17,02
1955-56	3,696	25,61
1960-61	4,360	39,52
1961-62	4,493	42,02
1964-65	4,591	45,58

U.P. produces more than 25 per cent of total production. About 20 per cent is produced in Bihar. The other producers, in order of importance, are Rajasthan, the Punjab, Haryana, Madhya Pradesh, Jammu and Kashmir and Gujarat.

Maize is raised mainly for consumption in the area of its production, and exports are never considerable. India exports an insignificant quantity of maize, that is to say, a little more than 200 metric tonnes a year. Exports are mainly from Bombay and Calcutta. Bombay alone handles more than 50 per cent of exports.

In recent years, certain industrial firms in India have developed the production of starch and glucose from maize.



Pulses

Pulses include food grains like gram, *arhar*, lentils or *masur*, etc. These grains are raised in different parts of India and consumed mostly in the respective areas of their production. They are important both from the point of view of husbandry and of nutrition. Their nutrition value is high as a source of protein.

Pulses constitute an important foodstaff not only for human consumption but for animals as well. They are also grown as rotation crops with a view to restoring the fertility of the soil.

Total Quantity of Pulses: Hectarage and Production

Year	*Area* (Thousand Hectares)	*Production* (Thousand Tonnes)
1950-51	19,000	82,78
1955-56	23,000	1,08,71
1960-61	23,000	1,24,52
1961-62	24,000	1,14,47
1964-65	392,86	1,23,78

Gram

Gram is the most important pulse and is grown extensively in the U.P. Other gram-producing areas are the Punjab, Haryana and Madhya Pradesh, Maharashtra and Mysore. It is often cultivated in combination with wheat. The output of gram in 1964-65 was 5.7 million metric tonnes and the area under cultivation was 9 million hectares.

The leading producers are U.P., the Punjab, Haryana, and Madhya Pradesh which account for more than 75 per cent of the total production. The other producers are Rajasthan, Bihar, Maharashtra and West Bengal. However, as a foreign exchange earner it is of little significance since the internal consumption of gram leaves hardly any surplus for export.

Lentil and Arhar

Lentil or *Masur* is grown particularly in the Madhya Pradesh, Tamil Nadu and U.P., though it is cultivated in other States too. *Arhar* is another most important foodstuff of the countryside and is generally grown as a mixed crop, particularly in rotation with cereals. The annual production of these two pulses is about 4 million tonnes.

The exports of pulses are made to countries like the U.K., Ceylon, Mauritius, Burma, and France. Calcutta, Madras and Bombay ports of India handle the exports of these grains.

Tea

India is the largest producer of tea in the world. The crop is, however, highly concentrated in a few hilly districts of India. Nearly 76% of the total area lies in Assam and in the two adjoining districts of Darjeeling and Jalpaiguri in North Bengal. The principal belt of tea plantations lies between 23° and 32° N Latitude. The elevated region over the Malabar Coast in Southern India contains about 19 p.c. of the total. The Punjab, U.P. and Bihar account for the rest.

Soil and Climate: The Tea-plant requires a deep fertile soil, which must be exceptionally well-drained, and completely free of stagnant water. It is, therefore, generally grown on hill sides. High temperature is essential for tea-cultivation. While it is true that tea has a fairly wide range of cultivation, the optimum conditions are better provided in a warm and humid climate. Warm summers are ideal but the plant is not very sensitive to or easily injured by frost. Abundant rainfall, usually of not less than 2000 mm is required. As tea leaves are required to be picked by hand, abundant labour supply is no less an important factor in tea production.

Varieties of Tea: Tea leaves, after they are picked from the garden, are dried by heating in the factory or in the sun and then crushed and rolled before they are packed. There are two main varieties of tea—the green tea and the black tea—the difference between

the two being the difference in the process of curing the leaves. Green tea is unfermented. For black tea, the leaves are fermented before being finally dried.

Area and Production: In 1962-63, the tea production was 340,000 tonnes. The estimated production in 1965-66 under the Third Plan was 400,000 tonnes which meant an increase by 24 p.c. from the base level production of 321,000 tonnes in 1960-61.

Tea: Hectarage and Production, 1962-63

State	*Area* (Thousand Hectares)	*Production* (Thousand Metric Tonnes)
Assam	163	173·8
Tamil Nadu	33	39·7
Uttar Pradesh	2	1·0
Kerala	40	40·6
Punjab	4	1·1
West Bengal	83	84·2
Total	333	334·4

While Assam, which is the leading producer has not done much to increase the yield per hectare, in Tamil Nadu it is on the increase.

Yield of Tea per Hectare (in quintals) **1962-63**

Assam	10·6
Punjab	2·9
Mysore	10·3
Tamil Nadu	12·1
West Bengal	10·2
Kerala	10·2

Assam is the largest producer and contributes more than 50 per cent of the total Indian Tea production. In the districts of Darrang, Sibsagar, Lakhimpur in Upper Brahmaputra valley and in Cachar, tea-plantations cover more than 30 per cent of the sown area. The Sadia Frontier Tract also grows a large quantity. These areas are served magnificently by railway and rivers.

Although West Bengal occupies the second position among the tea-producing States of India, her tea-cultivation is not so extensive as that of Assam. The two adjoining districts of Darjeeling and Jalpaiguri produce almost the entire output of West Bengal.

The tea-plantation industry provides direct employment to more than a million persons in the country.

Tea Exports: India is the greatest tea-exporting country in the world, supplying as she does about 50 per cent of the world's trade in tea. Between 66 and 70 p.c. of the total production of tea in India is exported.

The major markets for Indian tea are the U.K., the U.S.A., Canada, the Irish Republic, Egypt, Iran, Australia, Netherlands, Western Germany, and Turkey. The U.K. accounts for more than two-thirds of India's tea exports every year and the prosperity of the tea industry depends to a very large extent on the demand for tea in the U.K. which is the largest consumer in the world.

In 1964-65, the percentage share of tea to India's total exports was 15.4, compared to 25 in 1958. Although the percentage share of tea has declined in connection with export trade, the foreign exchange earning from trade has been on the increase. The figures in percentage of tea export in terms of value for 1960 and 1964 are however not so encouraging as may be seen from the table below:

Destinations	1960-61	1964-65
U.K.	62·8	58·8
U.S.A.	4·3	5·1
Canada	3·8	2·7
Irish Republic	3·2	2·4
U.A.R.	3·8	5·5
U.S.S.R.	6·2	12·1

In 1964-65, however, India earned Rs. 124 crores from the export of tea, as against Rs. 109 crores in 1950-51. Since Indian tea has to compete in foreign markets with that of Ceylon, Indonesia, Pakistan, Japan, and East African countries, the exchange earnings are naturally not very steady. Ceylon is fast capturing foreign markets by

exporting instant tea. It is, therefore, desirable that India should take steps to produce and export instant tea.

According to the average figures of the last few years, India supplies nearly 60 per cent of the requirements of the U.K., 90 per cent of the Irish Republic, 35 per cent of the U.S.A., 45 per cent of Canada, and substantial quantities to Egypt, Australia and Iran.

Internal Consumption of Tea: The table given below shows how fast the internal demand for tea is increasing. At the same time, the volume of export has considerably decreased. To meet the increasing demand for tea within the country and to stimulate exports of tea, there is an urgent need to increase the production of tea. The Third Plan had, therefore, given high priority to tea plantation and envisaged additional production at the rate of 175 million lbs each year, so as to have an estimated production of 900 million lbs, in 1965-66.

Pattern of Disposal of Tea

(in million kgs.)

	1958	1959	1960	1962
Production	360	360	312	360
Internal consumption	196	124	162	139
Export	254	236	150	221
Percentage of export to production	70·6	65·6	51·3	56

Measures to Improve Production: Various measures are being taken in the country to increase production of tea. For example, there are many tea gardens which cannot approximate optimum production because of the low fertility of the soil and high transport charges. In such cases the Indian Tea Board has been subsidising the cost of fertilizers and transport charges as well as granting loans for repairs and renovation of plants. In addition to these measures of substantial assistance, there has also been an appreciable decrease in the export duty on tea after 1958.

Recently, there has been considerable improvement both in the quality and the quantity of tea per hectare of land. The average yield per hectare is now almost 10.7 quintals. The higher yield is evidently the result of the use of fertilizers and the timely pruning of plants. It is interesting to note that even though Tamil Nadu is not a large producer of tea, it has the highest yield per acre.

Coffee

As a beverage, coffee is next in importance only to tea. The cultivation of coffee was first adopted by Arabia from the highlands of Ethiopia, and for a long time Arabia remained practically the only source of supply.

Coffee in India: Systematic cultivation of coffee in India was first started sometime in 1830 when a large plantation was started in Mysore. Today, Mysore along with Kerala and Tamil Nadu has the monopoly of coffee cultivation in the Country. Thus Southern India alone has nearly 7,000 coffee-plantations which employ 65,000 permanent labourers and 35,000 temporary labourers. Mysore alone possesses 4,600 plantations. In Mysore, the plantations are mostly confined to the south and west, particularly in the districts of Kadur, Shimoga, Hasan and Mysore. Mysore has the largest hectarage under coffee plantation and production is always over 80 per cent of India's total. In Tamil Nadu coffee-plantations are found mostly in the south-west from North Arcot to Tirunelveli including the western areas. The Nilgiris is the most productive area of Tamil Nadu. In Coorg, more than 20 per cent of the total area is under coffee. A little coffee is also grown in Satara district of Maharashtra. Attempts are being made to grow coffee in new areas like Araku Valley in Andhra Pradesh, in parts of West Bengal, Assam and Andamans.

Soil and Climate: Coffee is a tropical product requiring a warm, if not actually a hot climate, a heavy rainfall between 1,500 and 2,000 mm., and a rich, well-drained soil. The optimum temperature is between 59°F and 77°F. The coffee shrub bears a red fruit or berry within which are enclosed the beans of coffee. When roasted, these beans assume a brown colour. Although hot conditions are necessary, the shrub must be sheltered from the direct rays of the sun. Rows of banana or some other shade-giving trees are therefore planted between two rows of coffee trees. The hill slopes or the plateau slopes of the rainy tropics provide the most suitable sites for coffee cultivation. The plantations are generally located between levels 600 to 1,200 metres on hilly forest lands. These areas are exposed to the summer monsoon. The optimum altitude and rainfall vary from district to district in North Mysore. For example, the best yields are obtained from estates at an altitude of about 1,000 metres with an annual rainfall of 1,250 mm, although in North Coorg which is at an altitude of 1,050 metres a rainfall of nearly 2,000 mm is enough.

Coffee Sowing Season: In India the plant is sown in the rainy season and the berries begin to ripen in October. Plucking and hand-picking of berries continue till January.

Varieties of Coffee: There are two varieties of coffee—Arabica and Robusta—of which the former accounts for 75 per cent of the coffee production in India. Arabica coffee is noted for its good quality; Robusta has better resistance to pests and diseases, yields more and is cheaper to produce.

Area and Production: Nearly 117,000 hectares of land are under coffee-plantation and the average production is 40,000 tonnes. The average yield of coffee per hectare is 4.1 quintals, lowest being 1.6 quintals in Madras. The production of coffee has increased from 24,000 metric tonnes, in 1950 to 43,000 metric tonnes in 1962, which has been possible because of the increase in the yield per acre.

Area and Production—1963

States	*Area* (Thousand Hectares)	*Production* (Thousand Metric Tonnes)
Kerala	19	8·5
Tamil Nadu	20	2·9
Mysore	78	29·0
Total	177	40·4

Increase in Production: About 25 crores of rupees have been invested in coffee-plantations. The Third Plan envisaged an annual production of 80,000 tonnes, and more than two-fold increase in exports of coffee from the present level of 18,000 tonnes.

Coffee Exports: Indian coffee is exported to the U.K., France, Germany, the Netherlands, Belgium, Australia and Iraq. The U.K. is the largest buyer of Indian coffee and purchases about one-third of the total coffee exported. Participating ports in the export trade are Mangalore, Tellicherry, Calicut and Madras. The export of Indian coffee is often affected by competition from Brazilian coffee which dominates the coffee market of the world today. In 1960-61 and 1964-65, India earned foreign exchange through export of coffee to the tune of Rs. 7 crores and Rs. 13 crores, respectively. The following table gives the figures of production, export and internal consumption.

	Production	*Export*	*Internal consumption*
	(in thousand metric tonnes)		
1952-53	23	3	20
1955-56	34	10	20
1956-57	42	15	27
1958-59	46	18	27
1960-61	50	18	30
1964-65	52	20	32

The main problem before the coffee industry is to maintain the growing internal market as well as to promote export. The Indian Coffee Board, which was constituted under the provisions of the Coffee Market Association Act, 1957, controls the marketing and

export of coffee. All coffee grown in the country is required to be delivered into a pool maintained by the Coffee Board. Coffee is then released for the internal market through public auctions and co-operative societies and exports are allowed only under licences issued by the Board. The Board is also responsible for publicity and propaganda.

India is a signatory to the International Coffee Agreement of 1962 and has accepted the quota system of exports. India can export up to 21,000 tonnes of coffee to countries which are a party to the agreement. But India can export to other countries without any limit.

Tobacco

The use of tobacco in some form or the other is now universal. Apart from its general use as a smoke, tobacco is also used for the preparation of medicines and insecticides. The total world consumption of tobacco is necessarily enormous and so is its production. Indigenous to tropical America, tobacco was first brought to Europe by the Spaniards in the 16th Century and later on introduced into other parts of the world.

Tobacco in India: The tobacco plant was first introduced into India by the Portuguese in 1598. Subsequently, its cultivation spread gradually to various parts of the country. It has a wide climatic range and is cultivated throughout the country. The harvesting period is between February and April.

India is the second largest tobacco-producing country in the world and contributes about 35 per cent of the world's total production. India, together with the U.S.A. and China, accounts for 60 per cent of the world's tobacco-growing areas. The area under tobacco in India was a little more than 423,000 hectares in 1964-65 and production about 370,000 tonnes. The estimated tobacco production at the end of Fourth Plan is at 475,000 tonnes, that is an increase of 19 per cent over 1965-66.

Area and Production: Tobacco cultivation is geographically confined to two main zones—the Eastern Zone, comprising Bihar, U.P. and West Bengal, and the Western and Southern Zones, comprising Tamil Nadu, Andhra Pradesh, Mysore and Maharashtra. The area and production of tobacco in India are indicated in the following tables:

Year	*Area* (Thousand Hectares)	*Production* (Thousand Metric Tonnes)
1950-51	357	257
1955-56	410	298
1960-61	400	307
1961-62	421	343
1964-65	423	370

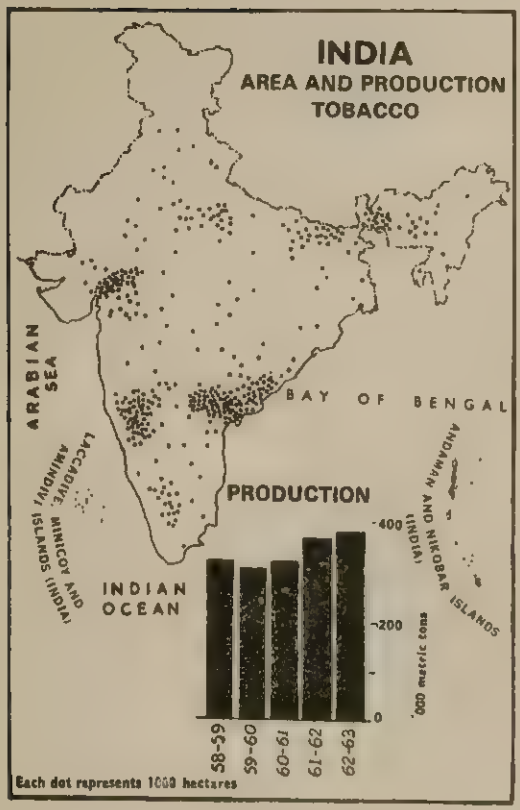
State-wise Figures of Area and Production in 1962-63

State	*Area* (Thousand Hectares)	*Production* (Thousand Metric Tonnes)
Andhra Pradesh	164	136
Maharashtra	98	15
Tamil Nadu	80	29
Mysore	44	27
West Bengal	15	11
Gujarat	93	70

Varieties of Tobacco: There are two varieties of tobacco in India—Nicotiana Tobucum and Nicotiana Rustica of which the former is important for export, and the manufacture of cigarettes and cigars in India. Nicotiana Rustica is in demand for *hookah,* chewing and snuff. Though 90 per cent of our tobacco is Nicotiana Tobucum, the top grade virginia type accounts for only 15 per cent.

It may be mentioned in this connection that for export purposes the Virginia type of Nicotiana Tobucum is in great demand. The pattern of consumption of Tobacco in India is as follows:

Cigarettes	25 p.c.
Chewing and Hookah	25 p.c.
Bidi	20 p.c.
Cigar, Cheroots	30 p.c.



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(ii) The demarcation of the Gujarat-West-Pakistan Boundary is in accordance with the Indo-Pakistan-Western Boundary case. Tribunal Award is in progress (1969).

Soil and Climate: Though a native of the tropical lands, tobacco has a very wide range of cultivation. Probably no other commodity of commerce is cultivated under such divergent climatic and soil conditions. The minimum requirements are a fair amount of warmth and a moderate amount of moisture. Having a short season of growth it can be cultivated in all parts of the tropics and even as far as latitudes 50° north and south. The plant is rather an exhausting one, requiring a soil that is rich in lime and potash. The tobacco plant which is always transplanted by manual labour calls for constant and careful attention throughout the period of its growth. Its cultivation is therefore naturally confined to lands of abundant labour. Slight variation in weather or soil brings about a remarkable variation in the quality of the tobacco leaf. There are innumerable varieties of tobacco, the quality in each case depending on the weight, colour, elasticity and soils. Certain special qualities will grow only under special combinations of climate and soil. Transplanted from one region to another, tobacco does not retain its original characteristics of aroma, colour etc., and so, in spite of widespread cultivation specialization of regions in production of special quality of tobacco continues. Many types of tobacco are also named according to the locality from which they come.

The yield per hectare varies greatly due to soil and climate conditions of the producing regions. The yield per hectare in quintals during 1962-63 is as follows:

Western and Southern Zone		*Eastern Zone*	
Tamil Nadu	15·0	Bihar	9·3
Andhra Pradesh	8·3	U.P.	8·2
Mysore	6·1	West Bengal	7·3
Maharashtra	5·5		
Gujarat	10·4	All India	8·5

Geographical Distribution: About 40 per cent of the production of raw tobacco in the country comes from Andhra where the important tobacco-growing districts are Guntur, Vishakhapatnam, East Godavari and Bihar. Two-thirds of the total hectarage of Andhra are confined to Guntur. Andhra Pradesh is noted for cigarette, virginia and cigar, tobacco, cheroot tobacco, chewing tobacco and snuff.

Gujarat is the second largest producer of tobacco. The tobacco-growing regions are Baroda and Kaira. In 1962-63, Gujarat produced about 20 per cent of the total production. Tamil Nadu occupies the third place, and contributes about 8 per cent of the total production. Madras tobacco is used for cheroots and cigars. The districts of Muzaf-

farpur, Darbhanga, Monghyr and Purnea produce 90 per cent of Bihar tobacco. In West Bengal, tobacco tracts include Jalpaiguri and Cooch Bihar; some tobacco is also raised in Hooghly. West Bengal raises only cigar and *hookah* tobacco.

Export of Tobacco: Although India is the second largest tobacco-producing country in the world, her share in the world's export trade of tobacco is hardly 10 per cent. Of the average production, only about 16 to 18 per cent is exported. Virginia tobacco produced in Andhra Pradesh forms the bulk of our tobacco exports. The important markets are the U.K., China, Japan, Aden, the U.S.S.R., Ceylon, the U.A.R., Hong Kong, Indonesia and the Netherlands. In the U.K. and other continental countries, the Indian flue-cured Virginia tobacco has a demand in the cigarette manufacturing industry. As the exports are confined to high grade tobacco, the Third Plan aimed at increasing the output of superior grade from 15 per cent to 25 per cent.

Export of Tobacco

	Quantity (in lakh kilograms)	*Value* (in lakh rupees)
1959-60	410	14.54
1960-61	474	15.74
1964-65	638	25.70

In 1965-66, the value of exports of tobacco has declined to Rs. 19.60 lakhs.

The U.K. has always been the chief market for Indian tobacco. One of the steps taken by Government to maintain the upward trend of Indian tobacco exports is to include tobacco in bilateral trade agreements. There is reason to believe that with a little more initiative and drive, India can create market for her tobacco in the West Asian countries and West Germany.

India imports unmanufactured tobacco from the U.A.R., Turkey and the U.S.A. in small quantities.

Sugarcane

Sugarcane and its products have been known in India from very ancient times. The earliest record of sugarcane occurs in the Atharva Veda which was composed by the Aryans in India about 1000 B.C. and 500 B.C.

Sugarcane Tracts in India: India is the most important sugar-producing country. It has approximately 37 per cent of the world's sugarcane area. Although sugarcane is cultivated throughout India, the most important sugarcane tracts are in U.P., Bihar, West Bengal, the Punjab, Haryana and Maharashtra. In fact, Northern India has a great interest in this crop producing as it does about 70 per cent of the total production. From the point of view of climate, Peninsular India is ideal for sugarcane cultivation. The average yield of sugarcane in the South is about four times as high as that in the North.

Soil and Climate: Sugarcane is a type of grass, partly resembling the maize plant in appearance and rising to a height of 2.5 to 4.5 metres. It is cultivated for the juice contents of the stem. It is a tropical and sub-tropical product requiring abundant heat with an average temperature of about 26°C., rainfall of not less than 1000 mm and low lands with rich deep soil. Certain amount of moisture either from rains or from irrigation, is also an essential condition during its long period of growth. During the ripening of the crop, however, the weather should be preferably dry. Excess of moisture, specially at ripening time has the effect of diluting the juice and reducing the sugar content in the cane.

Area and Production: The geographical distribution of the sugarcane crop in India,

and the production figures are given in the following tables:

(1) Yield of Sugarcane (gur) per Hectare during 1958-59 to 1962-63 (*in Quintals*)

Andhra Pradesh	90.2	Bihar	30.1
Maharashtra	60.5	U.P.	34.5
Tamil Nadu	85.5	Punjab and Haryana	32.4
Mysore	84.5	Orissa	29.8
		West Bengal	43.5
All India	40.9		

(2) Area and Production of Sugarcane in India

	Area (Thousand Hectares)	*Production* (Thousand Metric Tonnes)
1950-51	1,707	57,051
1955-56	1,847	60,543
1960-61	2,415	1,08,973
1961-62	2,423	99,853
1964-65	2,544	1,22,127

It is estimated that the production of sugarcane (*gur*) at the end of Fourth Plan (1970-71) will be 13.5 million tonnes. Approximately 55 per cent of the total sugarcane product in India is utilized for the manufacture of *gur* and *khandsari*. Only 25 per cent of cane goes to the mills for the manufacture of crystal sugar.

Geographical Distribution: U.P. produces about 45 per cent of India's total output. It was estimated that by the end of the Third Plan its annual production in U.P. would increase to 42 million tonnes.

Maharashtra with about 9 million tonnes of production in 1963 occupies second position as a producer of sugarcane. It raises a little more than 10 per cent of India's total production of sugarcane. It was expected to increase its production by 34 per cent by the end of the Third Plan i.e., 11 million tonnes of sugarcane a year after 1965-66.

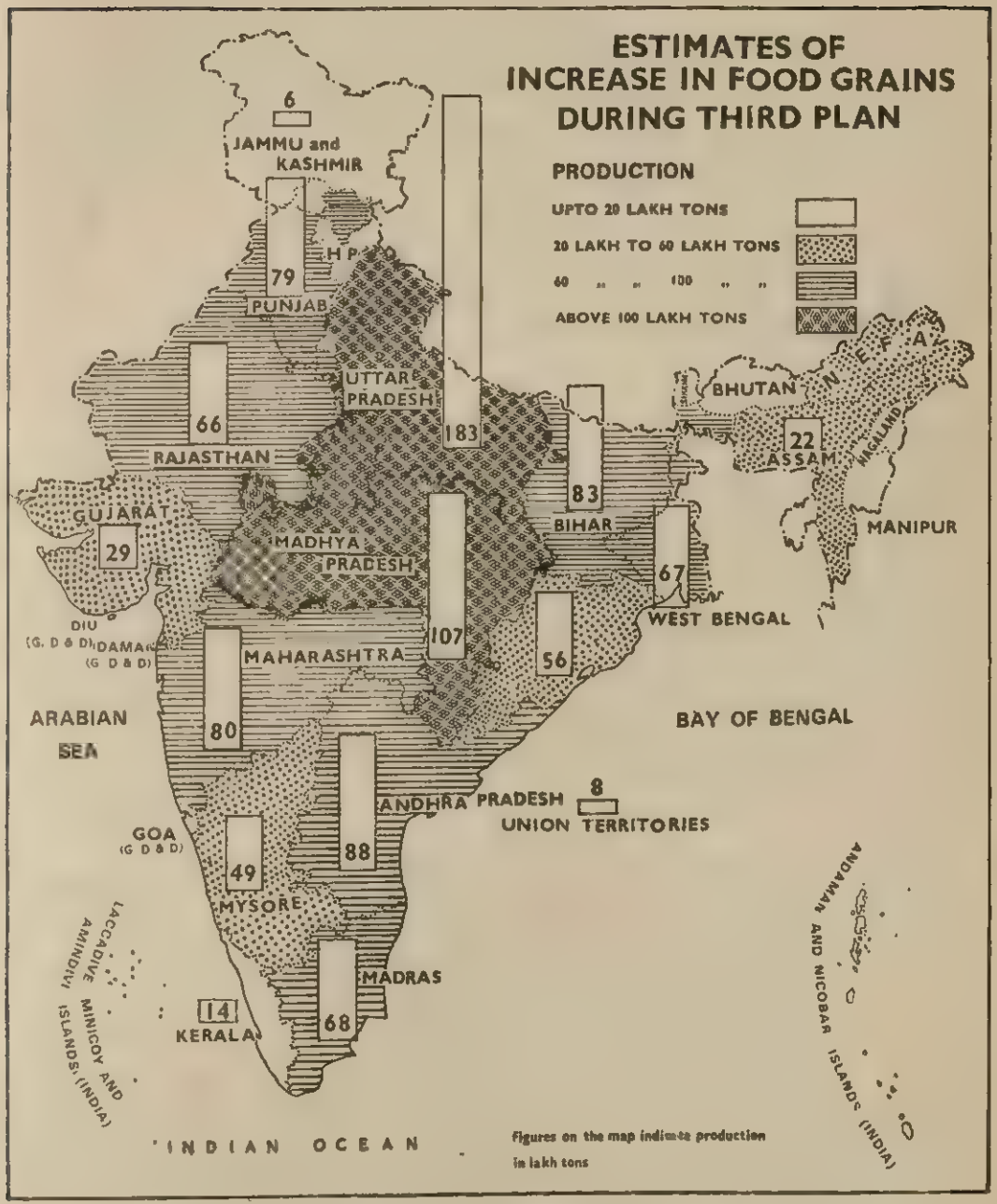
The Punjab and Haryana together have become the third largest sugarcane producers from 1965-66, followed by Andhra Pradesh with 7 million tonnes and Mysore with 6 million tonnes. Bihar produces about 5 million tonnes a year. West Bengal produces about 10.3 million tonnes of sugarcane a year but the quality is poor. The Third Plan envisaged an annual production of 108 thousand tonnes. Thus it is observed that peninsular India holds immense possibilities for sugarcane cultivation.

The yield of sugarcane per hectare in India is, however, the lowest in the world. The following figures indicate India's position in regard to yield per hectare:

Country	*Average Yield of Sugarcane per Hectare in* 1960-61
India	34
Cuba	42
Puerto Rico	60
Hawai	155
Java	140
Australia	53
Mauritius	49

Reasons for Low Yield: Sugarcane cultivation in India is a constant struggle against declining yield. The average yield of 34 tonnes per hectare would have gone down, had it not been for the development schemes during plan periods. The low yield per hectare in India is partly due to small holdings of the cultivators and partly due to soil and lack of irrigation facilities. It should also be possible to increase the yield per hectare with the introduction of better varieties. Even if an increase in the yield by 25 per cent is achieved, the production of cane would increase by 14 million tonnes.

Recently, improved varieties of sugarcane are being introduced in different areas to replace the low-yielding indigenous varieties. It is also possible to adopt the method of cultivation used in Java with suitable modifications.



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Non-food Crops

The principal non-food crops are jute, cotton, oilseeds, and rubber.

Jute

Jute is a best fibre obtained from the bark of a plant. It is in great demand for making of gunny bags, hessian, twins and cordage. It has often been described as the brown paper of the wholesale trade. It is a straight, slender plant, growing to a height of three to five metres in a climate which has dampness as well as heat. It grows on a loamy soil or rich clay. The plant requires plenty of water after it is sown in spring. Again in autumn after harvesting it is kept under water to facilitate the removal of the fibre from the stalk.

The Jute Areas: Jute is mainly restricted to the Ganga Brahmaputra delta in the Bengal and Assam and in Bihar and Orissa, where the soil is enriched by alluvial deposits brought by river inundation. Alluvial deposits, without any expenditure on manure, favour the growth of this otherwise exhausting crop.

Sowing and Harvesting Periods: Jute is sown from March to May. The harvesting period begins in July and extends to September. In West Bengal, sowing is done in April and May, and harvesting time is mid-August to September. In Bihar and Assam, the time of sowing is March to April, while in Orissa it is May to June.

Area and Production: With the partition of India in 1947, India was left only with about 300,000 hectares of land under jute cultivation. The production was about 1.7 million bales of raw jute. Thus there was an acute shortage of this important raw material for the Indian Jute mill Industry.

The gap between production and the demand for raw jute had to be met partly by the jute substitutes such as mesta but largely by jute imports from Pakistan. Measures were adopted by the Government of India for the extension of jute cultivation not only in West Bengal and Assam, but also in Bihar, Orissa, Kerala, Tamil Nadu and Maharashtra. As a result of the vigorous efforts undertaken by the different States and the Central Government, India has about 800,000 hectares of land under jute cultivation and 300,000 hectares under mesta. Production is about 5.3 million bales of raw jute and 1.5 million bales of mesta. From the point of view of hectarage and production, West Bengal occupies the first place, followed by Assam, Bihar, Orissa, U.P., and Tripura. West Bengal raises about 50 per cent of India's total raw jute production. U.P. has 21,000 hectares of land under jute in the sub-mountainous tracts along the foot of the Himalayas which are fed by the rivers Sarju, Gogra and Gandak. In Orissa both area and production have increased considerably during the last four or five years. The plant is also cultivated extensively in the Cuttack district. The following tables give the area and production figures of jute and mesta in India:—

(1) Jute

	Area (in thousand hectares)	*Production* (in thousand bales of 180 kg. each)
1950-51	571	33,09
1955-56	704	42,32
1960-61	629	41,34
1961-62	923	63,47
1964-65	841	60,79

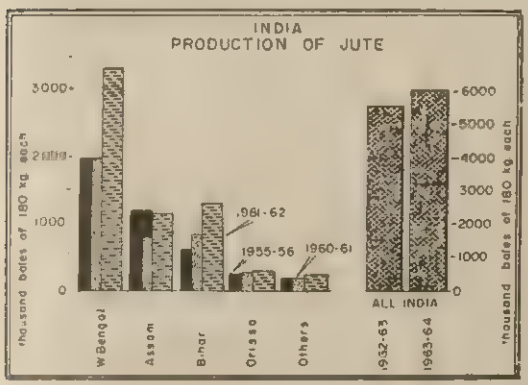
(2) Mesta

	Area (in thousand hectares)	*Production* (thousand bales of 180 kg. each)
1955-56	177	1,162
1960-61	270	1,140
1961-62	388	1,706
1964-65	359	1,589

State-wise Raw Jute Production
(in thousand bales)

	1955-56	1960-61	1961-62	1962-63
Assam	1,212	813	1,131	696
Bihar	589	839	1,263	1,024
Orissa	245	261	304	293
U.P.	89	89	114	151
West Bengal ..	2,013	1,987	3,352	3,113
Tripura ..	50	41	101	N.A.
Total	4,198	4,030	6,269	5,367

N.A. Not Available.



The yield of jute per hectare varies from state to state. The average yield of jute per hectare is 11 quintals, with Assam at 9.3 quintals, West Bengal 13.0 quintals, Bihar 9.4 quintals and U.P. 13.0 quintals.

Increase in Production: The use of improved seeds, suitable fertilizers and better plant protection measures can increase the yield of jute by 50 to 100 per cent. The normal requirements of raw jute by Indian mills are at about 67 lakh bales as against the present supply of 63 lakh bales of raw jute and 10 lakh bales of mesta. The Third Plan set a target of annual additional production of 2 million bales of raw jute each year so as to have an estimated production of 6.2 million tons in 1965-66. Mesta was to provide an additional 1.3 million bales. The production of raw jute has already exceeded the target of the Third Plan. At the end of Fourth Plan, raw jute production is expected to be 9 million bales i.e., an increase of 45 per cent over 1965-66.

Import of Raw Jute: Inspite of the increasing production of raw jute, India has to import a considerable quantity from East Pakistan. The extent of dependence on foreign raw jute has been reduced in recent years. In 1964-65, India spent Rs. 73 million on importing raw jute as against Rs. 276 million in 1950-51.

Mesta

Because of the shortage of jute fibre after the partition, the development of Mesta fibre received great importance in India. Mesta can also thrive in areas which are not quite suitable for jute crop. Like Jute, it grows to a height of 3 to 5 metres and is kept under water to separate the fibre. Although mesta is inferior to jute in respect of strength and fineness, it is being used with jute in India for the production of hessian and gunnies. In fact, usefulness of mesta has made the Indian Jute mill indutry less dependent on foreign sources for raw jute. The geographical distribution of mesta in India is as follows:

	Area (Thousand Hectares 1962-63)	*Production* (Thousand Bales 1962-63
Andhra Pradesh	54	261
Maharashtra ..	43	100
West Bengal ..	133	710
Bihar	52	196
All-India ..	348	1,522

In 1965-66, production of mesta was 1.8 million bales. By 1970-71 the increase in production will be to the extent of 11 per cent over 1965-66.

The production of mesta in West Bengal—the home of jute mill industry—has increased tremendously. Andhra's production is one-third of that of West Bengal. The increased production of mesta in West Bengal is due to higher yield per hectare.

Mesta is also produced in Assam, Madhya Pradesh, Mysore, and Orissa. The crop is known in the different parts of India by different names such as Ambadi in Maharashtra, Bimli in Andhra, Deccan hemp in Hyderabad, Pusa hemp in Bihar and Mesta in Bengal.

Cotton

Cotton is the most important textile fibre, being universally used in the hot, warm and even cold countries. Cotton is a fibre surrounding the seed in the boll or pod of the cotton plant. It is cultivated in a fairly wide climatic range but the ideal conditions are provided by a moderately high summer temperature, bright sunshine and not less than 30" of rainfall during the period of growth.

Cotton in India: India is the second largest cotton-producing country in the world in respect of hectare, next to the U.S.A. Yet her share in the world production is less than 10 per cent. Cotton holds the first place among the commercial crops of India.

Area and Production: The area and production of cotton in India are given in the following tables:

	Area (Thousand Hectares)	*Production* (Thousand Bales of 180 kg. in each)
1950-51 ..	5,882	2,875
1955-56 ..	8,086	3,945
1960-61 ..	7,610	5,293
1961-62 ..	7,719	4,512
1964-65 ..	8,154	5,408

The geographical distribution of Cotton in India 1963-64 is as follows:

State	*Area* (Thousand Hectares)	*Production* (Thousand Bales —392 lbs each)
Gujarat ..	1,640	1,255
Maharashtra ..	2,636	1,373
Madhya Pradesh	730	402
Tamil Nadu ..	414	405
Mysore.. ..	1,036	431
Punjab ..	662	1,118
Total ..	7,917	5,426

The estimate of raw cotton production at the end of the Fourth Plan is 8.6 million bales. This means that there will be an increase by 37 per cent over 1965-66.

Soil and Climate: India grows a large variety of cotton over a wide range of climate, soil and seasonal conditions, from the sub-montage tract in the extreme north of the Punjab to the Tinnevelly district of Tamil Nadu in the extreme south of India. Generally speaking, it is a dry-region crop and flourishes where the annual rainfall is less than 1,000 mm. The soil is equally important. The sticky black soil of the Deccan is ideal for its cultivation. It is cultivated in Maharashtra, Gujarat, Western parts of Andhra Pradesh, Tamil Nadu, Madhya Pradesh and parts of Rajasthan.

Varieties of Cotton in India: In India, cotton is considered long-staple when the fibre is 7/8 inch and above. When the fibre is below 7/8 inch and above 11/16 inch, it is medium staple, and short staple when it is 11/16 inches or less.

For a long time, India produced mainly short staple cotton. Thirty years ago the short staple cotton accounted for 58 per cent of the total production as against 13 per cent of long staple and 20 per cent of medium staple cotton. Since then, more and more areas have been put under improved varieties of cotton. The production of long staple and medium staple has remained constant. The area and production by staple length during 1961 at the rate of thousand bales of 392 lbs. each was as follows:

	Production 1951	1956	1961
Long Staple	684	1,610	2,441
Medium Staple	1,453	1,692	2,212
Short Staple	773	699	741

The areas of long staple cotton are: Maharashtra, Tamil Nadu, the Punjab, Haryana, Madhya Pradesh and Western Andhra Pradesh. Besides these areas where long staple

is available, medium staple cotton is largely grown in Rajasthan, Mysore and Uttar Pradesh, Assam, Manipur and Tripura can grow short staple cotton only.

Yield per Hectare: The average yield of cotton per hectare is lowest in India as compared to the U.A.R., Peru, Mexico, the U.S.A. and Pakistan; it is one-fourth of the U.A.R. and Peru, one third of Mexico and the U.S.A. and one-half of Pakistan. The average yield of cotton also varies from state to state. Generally speaking, the yield per hectare is higher in the irrigated areas than in rain-fed areas.

Cotton (Lint): Yield per Hectare in 1962-63
(in quintals)

Punjab & Haryana	2.8	Madhya Pradesh	0.7
Kerala	1.8	Tamil Nadu ..	1.8
U.P.	1.4	Maharashtra ..	0.8
Rajasthan ..	1.5	Mysore	0.7

All India : 1.2

Thus it will be seen that with the exception of the Punjab, the yield per hectare is nowhere higher than 1.8, the lowest being 0.7 in Mysore. The third Plan aimed at one quintal as the average yield per hectare.

Import of Cotton: Because of the progress of the production of long and medium staple varieties India is now less dependent on foreign cotton.

The imports are now mainly confined to those varieties of long staple cotton which are not produced in the country. The principal sources of foreign cotton are the U.S.A., Kenya, the U.A.R., Tanzania and Sudan. In 1964-65, the value of imported raw cotton was Rs. 581 million.

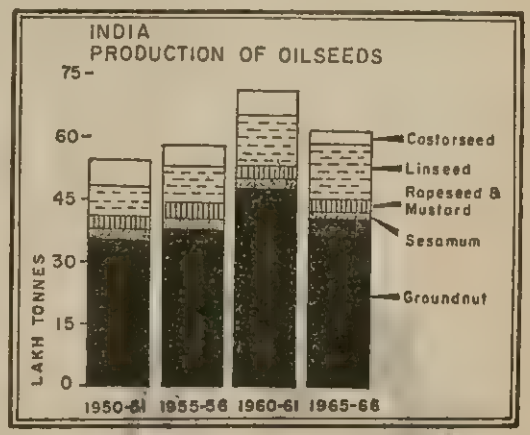
Export of Cotton: Japan has once again become the largest consumer of Indian cotton with a share of about 50 per cent followed by the U.K. with about 12 per cent. The value of raw cotton exported in 1964-65 was Rs. 141 million compared to Rs. 116 million in 1960-61.

Scope for Increased Production: Since India needs more long staple cotton and can increase the export of medium and short staple cotton the need for increasing the cultivation and production of cotton in the country is indeed great. There is considerable scope for cotton cultivation in Rajasthan, Maharashtra and Madhya Pradesh.

At the end of the Third Plan the production of raw cotton was estimated at 4.73 million bales and the target for the Fourth Plan is fixed at 8.6 million bales.

Oil Seeds

The trade in oilseeds is recent in India. Oilseeds are in demand not only for oil but also for preparing medicines, perfumes varnishes, lubricants, candles, soap manufactures and other purposes.



India is one of the leading oilseeds-producing countries of the world. With the exception of palm kernels, olives and soya beans, it raises all the principal oilseeds for world trade. But the more important are groundnut, cotton seed, rape seed and mustard. The figures relating to production

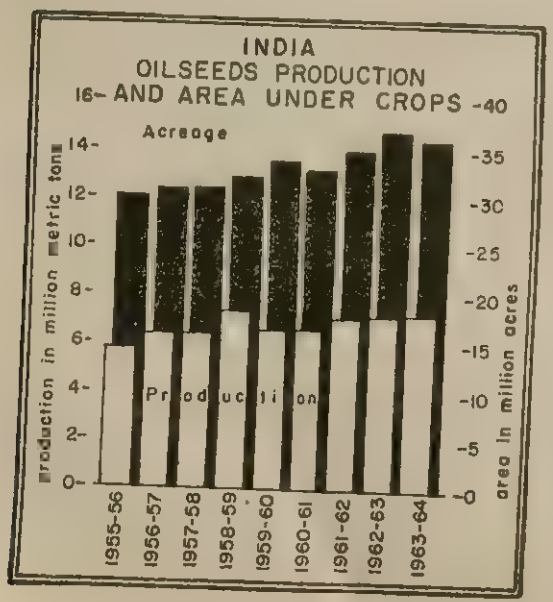
of important oilseeds and area under cultivation for 1964-65 were as follows:

Seeds	*Area* (Thousand Hectares)	*Production* (Thousand Tonnes)
Groundnut ..	7,072	6,176
Sesamum ..	2,503	466
Castor ..	449	101
Rapeseed ..	2,814	1,375
Linseed ..	2,011	466

The production of oilseeds in various states of India for four different periods (in thousand tonnes) was as follows:

	1951	1956	1961	1964
Andhra Pradesh	1,188	1,080	1,179	846
Gujarat ..	1,202	1,588	1,050	1,325
Uttar Pradesh	765	1,089	1,180	1,102
Tamil Nadu ..	870	945	1,050	1,157
Mysore.. ..	503	580	700	608
Total	5,643	6,352	7,084	7,096

Oilseeds which are grown both as a summer and a winter crop occupy about 13 million hectares of land and annual production is about 6 to 7 million tonnes. The production at the end of the Fourth Plan will be 10.7 million tonnes thus giving an increase of 43 per cent over 1965-66.



Export: So far as export is concerned the policy is to encourage export of vegetable oils and not seeds. About Rs. 7 crores were earned as foreign exchange in 1964-65 from the exports of oils. Recently the export policy with regard to oilseeds, vegetable oils and oilcakes has been considerably liberalised to earn more foreign exchange.

Increase in Production: Since there is an urgent need for exploiting all available lands for foodcrops, the increase in the production of oilseeds will have to be made either in lands which are not usually suitable for food crops or doing off seasons. Thus, in Maharashtra and U.P. it is possible to grow the early variety of groundnuts before the rabi crops. Similarly in Mysore, an increase in the production of groundnuts is possible in the cotton belts. There are also great possibilities of extending groundnut cultivation in parts of the Punjab and Haryana.

Linseed

Linseed which is obtained from the seed of the flax plant is widely used in the making of varnish. India is the largest linseed-producing country in the world. Although it is one of the oldest fibre plants of India, it is cultivated in the same kind of land as wheat and grown soon after the monsoon is over.

Linseed Growing Areas in India: Linseed is mainly a rain-fed crop and harvested in February. The average rainfall of 760 to 1780 mm per annum is best suited for its cultivation. It is cultivated for its seeds mainly in U.P., Madhya Pradesh, Maharashtra, Bihar and Rajasthan. It is also cultivated in Andhra Pradesh, West Bengal, and the Punjab and Haryana. Madhya Pradesh is the leading producer followed by U.P. These two states normally supply about 70 per cent of India's production. The geographical distribution of linseed during 1964-65 was as follows:

	Area (Thousand Hectares)	*Pro-duction* (Thousand Tonnes)	*Yield per hectare* (in quintals)
Madhya Pradesh	620	115	2.4
Uttar Pradesh ..	700	114	1.8
Rajasthan ..	230	29	2.5
Maharashtra ..	235	40	2.3
West Bengal ..	58	10	2.7
Bihar	118	35	2.9
All-India	2,011	466	2.3

Export of Linseed: The U.K., France, Belgium, Italy and the Netherlands are the buyers of Indian linseed and linseed oil. About 17 million kg of linseed oil were exported in 1964-65 which earned Rs. 10 lakhs of foreign exchange.

Argentina is a formidable competitor to India in regard to linseed oil in the foreign markets.

Mustard and Rapeseed

The Indian name for mustard is *sarson*. India raised about 30 per cent of the total world production of rape and mustard seed. Its entire production is consumed within the country. It is a rabi crop and sowing begins in August. Its cultivation is restricted to the northern part of India and the principal areas are U.P., Rajasthan, Bihar, the Punjab and Haryana. U.P. alone supplies more than 60 per cent of the total production. In 1963-64, India had 3.1 million hectares under mustard and rapeseed and produced about 1.3 million tons.

It is exported to the United Kingdom, Italy, Belgium and France in small quantities. India's export prices of oil are higher than those of Canada or China. About 90 per cent of the entire production of seed is used for the extraction of oil in India.

Groundnut

India is the largest groundnut-producing country in the world followed by French West Africa, China, the U.S.A. and Indonesia. It is a product of a tropical climate and grown extensively in Peninsular India. It is sown in May-August and harvested in November-January. It is grown mostly in Gujarat, Maharashtra and Tamil Nadu which together supply about 60 per cent of the total production. The other producers are Andhra, Mysore and Rajasthan. Recently groundnuts have been introduced in Madhya Pradesh and U.P. Gujarat with its highest area has a yield of 5.1 quintals per hectare which is below the average yield of India. The geographical distribution of groundnut in India during 1963-64 stands as follows:—

	Area (Thousand Hectares)	*Pro-duction* (Thousand Tonnes)	*Yield per hectare* (in quintals)
Maharashtra ..	1,092	731	6.9
Andhra Pradesh	888	745	8.0
Mysore	860	569	5.1
Tamil Nadu ..	890	1,112	12.1
Gujarat	302	281	9.8
Madhya Pradesh	460	303	5.5
All India	7,072	6,176	6.9

Sesamum

India is the largest sesamum producing country in the world. The plant is grown on light and sandy soils and some varieties of it on the black cotton lands. The highest yield per hectare with 4.8 quintals is raised in Assam which has only 8,000 hectares of land under sesamum cultivation. U.P. is the leading producer, closely followed by Rajasthan. U.P. has also the largest area under sesamum cultivation, but its average yield per hectare is the lowest. The comparatively low yield per hectare in U.P. is due to its climatic conditions. The geographical distribution of sesamum during 1963-64 stood as follows:—

	Area (Thousand Hectares)	*Pro-duction* Thousand Metric Tonnes)	*Yield per hectare* (in quintals)
Uttar Pradesh ..	680	119	1.7
Rajasthan ..	478	29	1.3
Madhya Pradesh	336	55	1.7
Gujarat	115	21	2.0
Andhra Pradesh	225	46	2·2
All India ..	2,316	410	1.9

Small quantities of sesamum seeds are exported to the United Kingdom, France, Belgium, Italy and Egypt.

Castor Seed

India is the foremost producer of castor seed. Small quantities are also cultivated in China, Indo-China, Brazil and Indonesia.

The castor plant needs a warm climate. A fair amount of moisture and rainfall after sowing is essential to ensure good germination; but after the root system has developed less moisture is needed. The plant reaches a height of 6 to 9 metres.

Castor Areas in India: It is cultivated chiefly in Andhra Pradesh, Gujarat and Mysore. A little above 499,000 hectares of land were under castor plants during 1964-65 with 1,01,000 tonnes of production. About 50 per cent of the production comes from Andhra Pradesh. Gujarat and Mysore produce 20 per cent and 10 per cent respectively of the total production. The other producers are Tamil Nadu, Bihar, the Punjab and Haryana.

Export of Castor: Export of castor oil is considerable. The principal buyers are the U.K., France, the U.S.A., Belgium, Italy, West Germany and Canada.

In 1964-65, India exported about 47 million kg of castor oil and earned Rs. 3.4 crores as foreign exchange. The U.K. takes about 50 per cent of the castor oil exported, followed by the U.S.A. with about 20 per cent.

Coconut and Copra

Coconut is a very important source of vegetable oil. The tree is widely grown on islands and near the sea shores of tropical lands. High temperature and heavy rainfall on alluvial lands are the ideal conditions for its growth. The tree takes 5 to 10 years to mature after which it continues to bear fruit for about 80 years. Each tree yields on an average 50 to 70 fruits per day. The Chief products of the coconut are copra and coir fibre.

Copra is the commercial name for the *kernal* of the coconut, broken into small pieces and dried in the sun. Its oil is edible and used for cooking purposes and for the manufacture of margarine and other butter substitutes.

India is the second largest coconut-growing country in the world. There are 600,000 hectares of land under coconut cultivation in India. In 1965-66 coconut production was 4713 million nuts. It is estimated that by 1970-71, the production will be 5113 million nuts. Kerala supplies more than 75 per cent of the production. Andhra Pradesh, Maharashtra, Gujarat, Orissa and West Bengal are the other producers.

About 45 per cent of India's production of mature nuts is utilised for making copra, while an equal quantity is used also for curries, chutney, puddings, etc.

Cotton Seed

The cotton seed oil is used for cooking, in pharmacy in the preparation of lard and margarines and as a substitute for olive oil.

Maharashtra, the Punjab, Haryana, Madhya Pradesh, Andhra Pradesh and Tamil Nadu are the chief producers.

Rubber

During the present century, rubber has come to be regarded as one of the most important commodities of commerce. Its indispensability in the automobile industry, its use for the making of tyres, shoes, macintoshes and many other articles of similar utility has so tremendously increased its consumption that now-a-days it has become the most important plantation crop in the world.

Rubber in India : Rubber plantation was first introduced in India in 1902 on the banks of Periyar in Kerala. With the outbreak of the Second World War and the fall of S.E. Asia in 1942, the rubber industry in India received a great impetus. Since then the industry is progressing.

Rubber tree is a native of the equatorial region and is now planted in areas where the daily temperature is between 20°c to 30°c with an annual rainfall of 2,000 to 3,000 mm. Cheap labour is an essential factor because latex from each tree is to be collected everyday and the plantation kept clear of weeds.

India produces about 25,000 tonnes of rubber annually. Of this, not more than 50 per cent is first grade rubber, the rest of lower grades. Rubber is mainly grown in the southern part of India. Kerala, Tamil Nadu, Mysore are the producers of rubber. Both in respect of area and production, Kerala controls more than 90% of the production. The yield average per hectare is about 450 quintals of raw rubber, with Kerala at 570 kg. and Tamil Nadu at 260 kg.

In Southern India, the plantation employs a labour force of over 150,000 a year.

The following table gives the area and production of rubber:—

Area and Production of Rubber in India

	Area (in thousand hectares)	*Production* (in thousand tonnes)
1950-51 ..	57.6	14
1955-56 ..	70	23
1960-61 ..	129	25.4
1961-62 ..	138	27.4
1962-63 ..	128	31.9

Consumption of Rubber: Consumption of rubber has increased rapidly in recent years from 26,000 tonnes in 1955 to 80,000 tonnes in 1964. It was estimated that the requirement of rubber would be for 100,000 tonnes by the end of the Third Plan Period. To meet the increasing internal demand for rubber, the Government has plans to bring 50,000 hectares of land under high yielding rubber. Its production in 1965-66 aggregated to 50,530 m. tonnes as against the Third Plan Target of 45,000 tonnes.

One of the problems in the way of increasing production is the scarcity of suitable lands for large scale plantations. Climate and soil which are so important in the production of rubber do not permit many areas to develop rubber plantations. Moreover, many areas which can develop rubber plantation have been diverted to other crops; yet the planted area has doubled over the last 10 years.

Even if efforts to produce more natural rubber become successful, there is an urgent need for the production of synthetic rubber to meet the increasing demand for rubber. The inherent physical and chemical properties of synthetic rubber make it much superior to natural rubber in many applications. At present India is producing synthetic rubber in small quantity. The production of synthetic rubber in India has increased in recent years. It was 14,740 m. tonnes in 1965-66.

Imports of Rubber: India has been importing raw rubber from Malaysia, Indonesia and Ceylon. The production of synthetic rubber along with the increase in the production of natural rubber has improved India's position to a certain extent. In 1964-65, India spent Rs. 18 million on foreign raw rubber, as against Rs. 36 million in 1963-64.

Conclusion

Even though agriculture occupies a very important place in India's economy, it is in a very unsatisfactory condition. In fact, agriculture still remains one of the depressed industries in India. Obsolete methods, overwhelming dependence on rainfall and lack of fertilisers and better seeds give the farmer

not what he plans but what nature offers. The Five Year Plans have therefore kept programmes of agricultural production at the base of the comprehensive approach to the reconstruction of rural economy. The guiding consideration has been that agricultural efforts should not be impeded in any manner for want of financial or other resources.

For production programmes in agriculture, including large and small irrigation schemes, soil conservation and co-operation, the Fourth Five Year Plan has provisionally provided an outlay of about Rs. 2,000 crores, the comparable outlay in the Third Plan being of the order of about Rs. 920 crores.

Outlays on Agricultural Production

(Rs. in crores)

	Second Plan	*Third Plan*	*Fourth Plan*
Agricultural production ..	261	602	720
Minor irrigation	94.94	176.76	520
Soil conservation	17.61	72.73	218
Community development (Agriculture Programmes) ..	50.00	126.00	466

The principal technical programmes for increasing agricultural production, around which intensive work is being organised in different areas are: (*i*) minor irrigation; (*ii*) soil conservation, dry farming and land reclamation; (*iii*) supply of manures and fertilizers; (*iv*) seed multiplication and distribution; (*v*) plant protection; and (*vi*) better ploughs and improved agricultural implements, and adoption of scientific agricultural practices.

Reclamation Schemes: For increasing agricultural land, reclamation schemes are in progress in many states. U.P. Government has carried out some of the biggest reclamation schemes in Asia except Russia. In Ganga Khadir, in the Meerut district, a jungle-covered tract of nearly 20,000 hectares has been cleared and sown. In the marshy areas of Terai, nearly 25,000 hectares of useless land has been brought under the plough. In Madhya Pradesh the reclamation of land infested with the dreaded *kans* is one of its many outstanding performances. The land reclamation operations were started in 1948. The crops produced in the reclaimed land are found to be definitely superior to those in other areas. Between 1948 and 1964 about one million hectares of land have been reclaimed for cultivation.

Extensive use of machinery in large scale farming is the characteristic feature of modern agriculture in advanced countries of the west. The individual holdings in India are so small that mechanization will prove uneconomical unless size of holdings is increased or farms are organised on a co-operative basis. Mechanisation can no doubt help to bring larger areas under cultivation in a comparatively short time, but Indian soil and climate are not suited to its exterior use. It may, however, be used to open up new lands.

The whole of the country in the south between the Ghats and the sea-coast from Goa to Cannanore can also be developed to yield food crops. This region is known as *Malnad*. The chief characteristics of the region are the following:

(*a*) the rainfall is invariably over 1500 mm., (*b*) the area is full of evergreen forests; (*c*) the density of population is below the average of 80 to 115 per square km. The chief crops are paddy, betel nut, cardamom, pepper and coffee. Inspite of the great geographical advantages of the *Malnad* area, it is at present in a backward condition. The reasons are many—such as excessive rainfall, unhealthy climate, prevalence of malaria, inadequacy of communication and scarcity of labour. If these problems are solved *Malnad* will contribute substantially towards the production of foodgrains in the country. The use of tractors will enable the now in-

accessible lands to be brought under cultivation.

There is also a project to develop the desert tracts of Rajasthan by constructing a canal which will run through the Punjab and then enter Rajasthan territory. This will be one of the biggest irrigation projects of the world. The Rajasthan canal with a capacity of 18,500 cusecs at head will take off from the Harike barrage on the Sutlej just below its confluence with the Beas. The canal will go as far as Jaisalmar district through Bikaner. The Punjab portion of the canal will do no irrigation and will serve only as a feeder. About 1.34 million hectares of land will be available for cultivation. The extension of irrigation will also arrest the advance of the desert into western U.P. The project is now proposed to be executed in two stages. The first stage, comprising the Rajasthan feeder and the first 195 km of the Rajasthan canal, including take off channels, is expected to be completed in 1969-70. The second stage envisages the completion of the remaining length together with the distribution system below Naushera length branch and is expected to be completed in 1977-78. The Suratgarh branch and Rawatsar distributary have already been completed.

Questions and Discussion Topics

1. *Describe the geographical conditions under which rice is grown in different parts of India.*

2. *What regions of India are noted for wheat and jute cultivation, respectively ? Why ?*

3. *What regions of India have specialised in the cultivation of tea plant ? Why is tea important in India's foreign trade ?*

4. *What are the geographical and economic factors responsible for the cultivation of rubber in certain distinct regions of India ? Name the areas and show their distribution on an outline map of India.*

5. *What are the varieties of raw cotton in India ?*

6. *Discuss the scope for increasing raw cotton production in India.*

Chapter 5

Irrigation Works and Multipurpose Projects

Importance of Irrigation in India

As India is principally an agricultural country, the provision for adequate water supply is always great. The monsoons are, no doubt, the main source of water; but there are certain drawbacks inherent in the nature of such a source. Rainfall is uncertain in Rajasthan and many parts of the Punjab and Haryana in the sense that it may not arrive in time or in quantity normally expected. The distribution of rainfall is also not the same all over the country. About 30 per cent of the total area of the country receives rainfall between 0 and 750 mm; more than 1875 mm rainfall is received by only about 10 per cent of the total area and 60 per cent of the total area has rainfall between 750 and 1875 mm. Again, the absence of winter rain in most parts of India makes cultivation in winter difficult. Further, certain crops—sugarcane and rice—require more water than the monsoons can give. Lastly, eight per cent of the annual rainfall in India is received only in less than four months. Temperatures in India being suitable for the growth of crops throughout the year, the shortage and uncertainty of moisture supply are a great hindrance which only a well-planned system of irrigation can remove.

Irrigation in India

India occupies the most important place in the whole world so far as irrigation is concerned. (Roughly, India has the second largest irrigated area in the world.) Irrigation means supply of water to the fields by means of canals from rivers or from storage tanks or wells for agriculture. The largest canal systems of the world are found in our country. This is due largely to the fact that Nature has endowed India with certain advantages that are rarely met with in other parts of the world, that too, on such a large scale.

Natural Physical Factors in Irrigation

The geographical factors for irrigation in India are (a) the perennial rivers of the North with their sources in the perpetual snows of the Himalayas; (b) the gradual slope of the plains so that the canals taken out in the upper courses of the rivers easily irrigate the land in their lower valleys; (c) the absence of rocky ground in the plains enables easy cutting; (b) the fertile soil which makes the greatest use of irrigation; (e) claybeds deep in the sub-soil which act as reservoirs for the rain water which sinks through the porous alluvium of the plains and which is later tapped by wells; and (f) heavy rainfall during the monsoon making it possible to store up the water for use in the dry season.

India's Water Resources

The water resources of India have been estimated at 16,725,99 lakh cubic metres. About one-third of the resources can be used for irrigation. Up to 1951, about 17 per cent of the usable flow or 5.6 per cent of

the total annual flow had been utilized. By the end of the Second Plan about 1480,18 lakh cubic metres representing about 27 per cent of the usable flow or 8.9 per cent of the total annual flow was utilised. An additional 493,39 lakh cubic metres were aimed at in the Third Plan, bringing the proportion to about 36 per cent of the usable flow.

Ground Water Resources: Ground water can be utilised for irrigating areas which cannot be irrigated economically by canals or which are susceptible to water-logging. The areas which offer favourable scope for ground water development are the Ganga basin, the Sabarmati basin and coastal area in Tamil Nadu and Andhra Pradesh.

Areas in Need of Irrigation

The principal areas where irrigation is necessary are: Rajasthan, U.P., parts of Madhya Pradesh, Bihar, the Punjab, Haryana, Orissa and the whole of the Deccan Plateau, except for a range along the Western coast. In 1950-51, the total area under irrigation from all sources was only 22 million hectares. By 1960-61, the area increased to 28 million hectares.

At the end of the Third Plan, 36 million hectares of land in India were brought under irrigation of which major and medium irrigation schemes accounted for 17.2 million hectares. The Fourth Plan envisages an additional area of 10 million hectares giving a total of 46 million hectares under irrigation by 1970-71.

Methods of Irrigation

The most important means of irrigation in India are (i) Canals, (ii) Wells, and (iii) Tanks.

Canals

The canals are the most important source of irrigation. They may draw their water either from rivers or from artificial storage works. They are mostly constructed in Northern India because the rivers have a flow of water throughout the year and the regions are flat. Storage canals are mainly constructed in the Deccan. Here the rivers dry up during the hot season and, therefore, artificial storage is necessary. Rain water is stored across a valley by building a dam and then distributed to the neighbouring lands by means of canals. About 10.4 million hectares of land are irrigated through canals. The total capacity of India's canals is over 220,000 cusecs, and the canals are over 96,000 km in length.

Types of Canals: The canals in India are of two types: (a) Inundation canals and (b) Perennial canals.

Inundation canals are taken out from rivers without building any kind of weir at their head to regulate the flow of the river. Whenever the river is in floods, water passes into these canals.

As soon as the floods subside and the river falls below the level of the canal head, the canals dry up. The greatest defect is the uncertainty of water supply. They can provide irrigation only when the rivers are in floods. During the dry period when irrigation is needed most, these canals are useless. During this period cultivation is practised with the help of well-irrigation.

The perennial canals draw their water from rivers which have their flow of water throughout the year. Some form of barrage is put across a river and its water is diverted by means of canals to the neighbouring areas. The great canal systems in U.P. and the Punjab and Haryana are of this type. Many of the inundation canals are being transformed now into perennial canals. Through perennial irrigation, agricultural production in the "uncertain zone of rainfall" has been enormously increased, for unlike in the inundation method water is available

in the hot season and permits cultivation all the year round.

The conditions are excellent for developing irrigation in Haryana and in the Punjab. The terrain is flat with soft alluvial soil. The development of canal irrigation has transformed large areas of semi-deserts into fertile agricultural lands. About 4 million hectares of land are irrigated by canals and wells in the Punjab and Haryana.

The important canal systems in the Punjab and Haryana are: (a) Western Yamuna Canal, (b) Upper Bari Doab Canal, (c) Sirhind Canal, (d) Eastern Canal, and (e) Nangal barrage.

(i) The Western Yamuna Canal takes its water from the Yamuna river and irrigates the districts of Rohtak, Hisar, Patiala and Jind. More than 400,000 hectares of land are irrigated by 1900 channels of the canal. Under the Second and the Third Plans, the canal was remodelled to serve an additional area of about 227,000 hectares of land with irrigation.

(ii) Sirhind Canal takes its water from the Sutlej river at Rupar and irrigates the districts of Ludhiana, Ferozepore and Hisar, and Nabha. About 574,000 hectares of land are irrigated by this canal system.

(iii) The Upper Bari Doab canal takes its water from the Ravi river at Madhopur and irrigates the districts of Gurdaspur and Amritsar. This canal is extended to Pakistan. In winter, the supply of water in Ravi is not sufficient for the requirements of Upper Bari Doab canal and for months together not a drop is allowed to pass below Madhopur. It serves about 400,000 hectares of land.

In Tamil Nadu, about 3.2 million hectares of land are irrigated by tank-canals. The Periyar canal system is one of the best in Southern India. The flat land around Madurai covering an area of over 60,000 hectares is watered by the Periyar river. The Mettur irrigation system on the Cauvery river is the biggest in the country. The Mettur dam irrigates over 200,000 hectares of land. The other irrigation works in Tamil Nadu are Perinchani, Lower Bhavani, Araniar Reservoir, Sathanur and Pullambadi Canal system.

U.P. has the largest irrigated areas in India. Of the total cultivated area of 20 million hectares, the irrigated land accounts for about 6.4 million hectares. The prosperity of U.P. is largely founded on the great irrigation works. Irrigated regions cover nearly 27 per cent of the area sown. Rainfall in the Upper Ganges Valley is under 1000 mm. and irrigation is of vital importance. There are five large canal systems in the State.

(a) The Ganga Canal is the most important canal system of the State. It has its head works at Hardwar and irrigates over 600,000 hectares of land. The main canal is about 350 km long with branches and distributaries totalling 530 km. It also supplies water to the Agra Canal and the Lower Ganga Canal.

(b) The Agra Canal is taken off from the Yamuna near Delhi. It irrigates over 180,000 hectares of land.

(c) The Lower Ganga Canal is taken off at Narora in the district of Bulandshahr. The total length including channels exceeds 4800 km. It irrigates over 400,000 hectares of land.

(d) The Sarda Canal is the largest productive canal of the state. The river Sarda is one of the tributaries of the Ganga and rises from the Himalayas near Tanakpur on the Nepal border. The Sarda drains an area of about 9,600 km in the hills. From its source near Pithoragarh to Tanakpur, the river is known as Kali. Below Tanakpur, it is called the Sarda. After leaving Nainital district, it unites with the Kauriala to form the Ghagra. The headworks are situated at Bhanbansa on the border of Nepal. It

irrigates Rohilkhand and the Western part of Oudh. The Sarda system today serves an area of more than 800,000 hectares of land.

(e) The Eastern Yamuna canal serves the north-eastern part of the State. The Canal takes the water from the Yamuna near Faizabad.

Wells

Well irrigation is the indigenous form of irrigation in India. The Indian farmer finds it easy to dig a well and to maintain it without any engineering skill. Another advantage of well-irrigation is that it can be undertaken at any place where there is sub-soil water. About 7 million hectares of land in India are irrigated by means of wells.

Water is raised from wells either by manual labour, bullocks, water lifts, the persian wheel or by means of oil engines. Well irrigation is extensively used in U.P., Haryana, the Punjab, Tamil Nadu, Maharashtra, Rajasthan and Madhya Pradesh.

The tube wells are a recent development. At present, U.P., Bihar, the Punjab and Haryana are the states where tube-well irrigation has been extensively used. The tube-well can be expanded greatly in West Bengal, Tamil Nadu, Andhra Pradesh, Gujarat and parts of Maharashtra, which have a relatively sure supply of ground water. Besides, these areas have potentiality for 2 or 3 crops per year. An average tube-well with a 6 inch diameter tube can supply 33,000 gallons of water and irrigate about 160 hectares of land.

For successful tube-well irrigation, (a) the area must be in alluvial formations where water-bearing strata at various depths are found; (b) cheap power for lifting water must be available; (c) the soil should be of good quality so that high costs involved in the operation of tube-wells are compensated for by a larger produce.

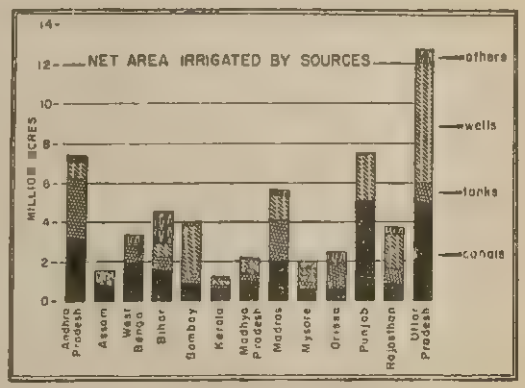
Tanks

Tanks are really hollows, natural or artificial, in which rain water is collected and stored up. Tank irrigation is mainly prevalent in Andhra Pradesh, Tamil Nadu, Orissa and U.P. About 5 million hectares of land are irrigated by tanks. The great advantage of tank irrigation is the storage of rain water in places where rivers dry up in summer or where well construction is not possible.

Tank Irrigation: State-wise
(In thousand hectares)

	1959-60	1962-63
Andhra Pradesh	1,255	1,316
Tamil Nadu ..	833	844
U.P.	419	434
Orissa	495	412
West Bengal ..	368	364
Mysore.. ..	349	366
All-India ..	4,706	4,676

Both wells and tanks require comparatively small outlays of capital, yield quick results and can be executed speedily with local resources. Tanks, however, cannot store water when there is a failure of rainfall in the locality.



Progress of Irrigation in India

The progress of irrigation in India has not been very rapid. Irrigated areas cover only 18 per cent of the total sown area in India. There is great scope for irrigation

in West Bengal, Bihar, Madhya Pradesh, Orissa, Gujarat, Maharashtra and the whole of Peninsular India. A number of irrigation works are under construction. In West Bengal, the Kangsabati and the Mayurakshi projects are being extended to serve an additional land of 600,000 hectares. The Narmada, Banas, Khakrapara, Ukai and Badar schemes in Gujarat will bring 750,000 hectares under cultivation on their completion. Maharashtra will have 250,000 hectares of new land under cultivation on the completion of the Purna, Mula and Girna schemes. The Tawa scheme in Madhya Pradesh will give water to 319,000 hectares of land by 1970. More than 560,000 hectares of land will be irrigated on the completion of the Kosi Project in Bihar. The Ram Ganga Project in U.P. will bring 690,000 hectares of land under irrigation by the end of the Fourth Plan.

Causes of Under-utilisation of Irrigation Facilities

Inspite of the presence of irrigation facilities, the use of such facilities has become a major problem in many areas. It has been observed lately that out of 2.5 million hectares of land which can use irrigation water as a result of the completion of a number of irrigation projects only about 1.2 million hectares of land make use of such facilities.

The reasons for under-utilisation are: (a) inadequate field channels and (b) high water charges. Many cultivators cannot make full use of water from irrigation schemes because of the high water rates and levels. Since water charges are levied on the basis of cost of irrigation schemes and not on the net benefits accruing to the cultivators the problem of under-irrigation will continue for some time to come. Then again in many parts of the country the practice is to apply water thinly so as to spread the benefits of irrigation to as large an area as possible. It has been observed that such a practice does not serve the purpose of intensive agriculture for securing high yields per hectare. It is, therefore, necessary to supplement water from undergound or surface water resources to make the supplies adequate, dependable and timely for intensive agriculture.

Gross Area Sown and Extent of Irrigation 1962-63

(In thousand hectares)

State	*Total Cropped Area*	*Net Area Irrigated*
Andhra ..	11,920	2,961
Assam ..	2,370	550
Bihar	10,134	1,678
Maharashtra & Gujarat	27,474	1,526
Kerala	2,087	422
Madhya Pradesh	16,620	836
Tamil Nadu ..	6,711	2,708
Mysore.. ..	10,106	696
Orissa	6,032	860
Punjab and Haryana ..	8,070	3,311
Rajasthan ..	11,230	1,341
Uttar Pradesh	20,257	5,472
West Bengal ..	6,151	1,188
Jammu & Kashmir ..	727	274
All India ..	1,46,800	25,200

Floods and Water Logging

There is an urgent need to provide drainage in irrigated areas to control floods and water logging. Water logging in certain parts of the country, particularly in the Punjab has become a very serious problem. Anti-water logging measures such as drains lining of irrigation channels in selected reaches and other steps to depress the ground water table have been taken on an extensive scale. Flood control schemes are also under way in many areas, where floods occur frequently and destroy crops during the monsoon. The Brahmaputra in Assam, the north-west rivers of the Punjab and U.P. and the rivers of Madhya Pradesh, Andhra Pradesh, West Bengal and Kerala are receiving attention for flood control. The Central Government has set up Central Flood Control Board to co-ordinate the work of various States in

this regard. In the third Plan period, Rs. 61 crores were expected to be spent on flood control, drainage, anti-water logging and anti-sea-erosion schemes.

The Multi-purpose River-valley Projects

Although India occupies the most important place in irrigation in the whole world, further extension of irrigation facilities to many areas is urgently needed so that agricultural production is stepped up in proportion to the demands of the growing population.

Several projects have been undertaken by the Central and State Governments for power and irrigation in India. The projects are being so designed as to provide not only for irrigation, but also for hydro-electric power, flood control, navigation, recreation facilities and fish culture. Hence these are known as multi-purpose projects. After their completion, India will be using about 10 per cent of her latent water-power capacity and about 7.6 million hectares of additional land will become available for cultivation.

For the development of some of these river-valleys thirteen multi-purpose projects and thirty-nine major irrigation schemes are under construction.

The multi-purpose river-valley projects are as follows:

(a) The Damodar Valley Project (the Hooghly basin)
(b) The Hirakund Project (the Orissa river system)
(c) The Tungabhadra Project (Andhra Pradesh and Mysore)
(d) The Narmada Project (Gujarat)
(e) Ramganga Project (U.P.)
(f) Bhakra Nangal Project (the Punjab, Haryana and Rajasthan)
(g) The Nagarjunsagar Project (Andhra Pradesh
(h) Gandak (Bihar and Uttar Pradesh)
(i) Parambikulam Project (Tamil Nadu)
(j) Bhadra (Mysore)
(k) Ukai Project (Gujarat)
(l) Tawa (Madhya Pradesh)
(m) Beas (the Punjab, Haryana and Rajasthan).

These projects will not only provide irrigation and generation of electric power for industrial purposes, but will also control floods, eradicate malaria, foster navigation, promote land reclamation and fish culture.

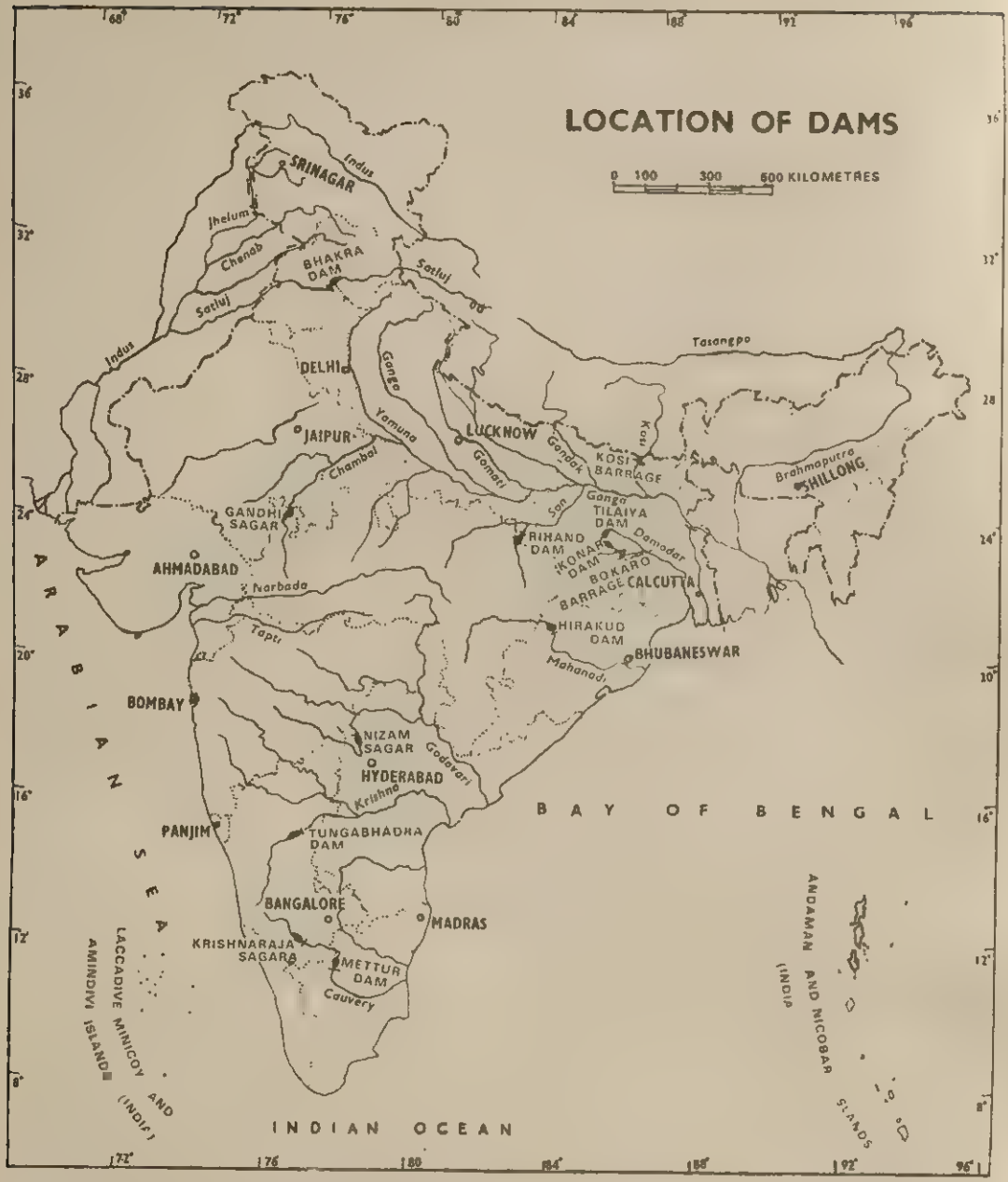
Some Major River-valley Projects

Damodar Valley Corporation Project

This project comprises four storage dams at Tilaiva, Konar, Maithon and Panchet Hill with hydel power houses of a total capacity of 1.04 lakh kw attached to all the dams except Konar; three thermal power stations at Bokaro, Durgapur and Chandrapura with a total capacity of 6.25 lakh kw; and extensive power transmission grid and an irrigation barrage at Durgapur with canals and distributaries. During the Third Plan, two units of 1.25 lakh kw each were expected to be added to the DVC system, raising the total power generating capacity to 9.79 kw.

The All-concrete Tilaiva Dam on the river Barkar, with earthen extension on either side was completed in 1953. The Konar Dam was completed in September 1955. The Maithon Dam on the river Barakar stores 13,618 lakh cubic metres of water, and the underground hydro-electric station near the dam has a capacity of 60,000 kw. It was completed in September, 1957.

Designed primarily for flood control, the Panchet Hill Dam, completed in December 1959, will impound 14,970 lakh cubic metres of water. A 40,000 kw-hydro-electric station built near the Dam was commissioned in September, 1959.



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The 681-metre long and 11-metre high barrage at Durgapur in West Bengal was opened in August, 1955. It will irrigate, on completion, over 3.8 lakh hectares of land. The operation and maintenance of the barrage and irrigation system was transferred to the Government of West Bengal with effect from December 2, 1963. Nearly 85 miles of the main left bank canal have been made navigable, providing an alternative means of communication between Calcutta and the coal-fields of Raniganj. The Bokaro thermal power station with an installed capacity of 1.50 lakh kw was commissioned in February, 1953. An additional unit of 75,000 kw has since been added to this station.

Damodar river is 538 km long. It has its source in the Hill of Chotanagpur at an elevation of 600 metres. After flowing for 288 km at Bihar, it enters West Bengal and ultimately joins the Hooghly. In its upper valley lie parts of Hazaribagh, Palamau, Ranchi, Manbhum and Santal Parganas in Bihar. Here, the annual rainfall is about 1,175 mm and most of the rain falls during the monsoons. The Damodar Valley has a catchment area of about 3,320 square km.

The Damodar Valley with its surrounding areas is the most highly developed industrial region in India. In it are situated India's two largest iron and steel plants, her largest fertilizer plant, the government locomotive works and cement works.

The Upper Damodar basin is very rich in timber, lac and tussore. The lower basin though very fertile is without proper system of irrigation, with the result that intensive cultivation is not possible. It contains the largest coal deposits of India and considerable quantities of bauxite and aluminium. The valley has also fire clay, china clay, mica, lime-stone, lead, silver, antimony and quartz. With cheap electric power these minerals can be properly exploited.

Other activities of the Damodar Valley Corporation are to assist in the development of small-scale and cottage industries by investigating into their possibilities and initiating pilot schemes.

The unavoidable limitations of the D.V.C. are the following:

(a) Owing to the extreme variations in the flow of water, floods in excess of the limits currently provided cannot be avoided; (b) the storage capacity of monsoon water is not adequate; and (c) hydro-electric power fluctuates very much from the monsoons to the dry season.

The original scheme of DVC was to have eight dams. With four dams the multi-purpose activities are not being carried out effectively. The power-system has extended far beyond what was originally contemplated. The new industrial region between West Bengal and Bihar—the Ruhr of India—has put tremendous pressure on the supply of power from DVC. The growing consumption of canal water in the new industrial area has brought about an acute shortage of water for rabi irrigation.

The Kosi Project

This is the most important irrigation scheme in Bihar. It is a multi-purpose project designed to serve irrigation, power, navigation, flood control, soil conservation drainage, reclamation of water-logged areas, malaria control, fish culture and other reclamation facilities. The project comprises a dam of about 225 metres high across the Chatra Gorge in Nepal which has freed an area of about 20,720 sq km in Bihar and Nepal from the ravages of the Kosi.

The power plant at the dam site on its completion will be capable of generating 1.8 million kw of cheap power.

The Tungabhadra Project

This project comprises the construction

of a dam 2,460 metres long and 48 metres high across the Tungabhadra, a major tributary of Krishna. The reservoir has a water spread of about 37,914 hectares and will serve Mysore and Andhra Pradesh.

The Bhakra and Nangal Project

This is the only multi-purpose project in the Punjab and Haryana. The States are without coal and petroleum fields. The remedy lies, therefore, in the development of hydro-electricity which will in turn facilitate agricultural production through electrically operated tubewells to make the area self-sufficient. The essential feature of the Bhakra project is a cement and concrete dam, 222 metres high, across the river Sutlej at the site of Bhakra Gorge, about 80 kw upstream of the present headwaters of the Sirhind Canal. Of the total storage capacity of the reservoir, nearly 60 per cent will be available for hydro-electric power generation and irrigation purposes every year. The dam ranks as the highest straight gravity dam in the world and surpasses the Hoover Dam in Nevada (U.S.A.) which is 216 metres high.

The dam will help to produce additional foodgrains of 1.3 million tonnes a year, cotton 0.8 million tonnes, sugarcane 0.5 million tonnes and oilseeds 0.1 million tonnes. No other river valley project in the world has so much food potential.

About 27.4 lakh hectares of land can be irrigated, and another 14.97 lakh hectares will get increased water supply on its completion.

The Nagarjunsagar Project

This project aims at irrigating an area of 8.1 lakh hectares in Andhra Pradesh. The reservoir is being constructed on the Krishna river at Nandi Konda about 161 km from Hyderabad. The water capacity of the reservoir will be 65,620 lakh cubic metres and its water spread 19,078 hectares. There will be two canals, one on each side of the river. The right bank canal will be 204 km long and the left bank canal 178 km long. It is expected that the Project will be ready for service by 1969 and will irrigate 8.1 lakh hectares.

The Rihand Valley Project

This is the most important multipurpose scheme in U.P. The Dam at Pipri, in the Mirzapur district on the river, Rihand, a tributary of the Son, will be the largest reservoir in India. The dam will be over 900 metres long. The scheme will confer numerous benefits on the countryside. The scheme will make possible the construction of 3,000 tubewells and 6,500 km of pumped canals from the Ghaghara, the Ganga and the Yamuna rivers. It will help to control floods in the Rihand and the Son, lessen soil erosion in the Rihand Valley, develop afforestation in Rewa and marginal lands in these areas.

The Narmada Project

There are 13 irrigation projects in Gujarat, of which the Narmada, Kakraparand Ukai are more important. The Narmada project is a part of multi-purpose development of the Narmada Basin. It will be completed in two stages. In the first stage, a dam will be constructed across the river near Navagam in Rajpipla Taluka of the Broach District so as to help irrigation of about 400,000 hectares of land. The second stage envisages supply of hydel power of the order of 625,000 kw at 60 per cent load factor.

The Kakrapara Project is the first phase of the development of the Tapti river valley. It will irrigate 2.27 lakh hectares in Surat district.

The Ukai Project in Gujarat envisages the construction of a reservoir on the river Tapti at Okai at Surat district for the purpose of irrigating 85,000 hectares of land through

canals. Flood control is an additional feature of the project.

Conclusion

To sum up a little more than 24 million hectares of land in India are irrigated by canals, tanks, wells and other sources. The presence of a number of rivers in areas which are flat and contain appropriate kinds of soil accounts for the importance of canal irrigation. About 10 million hectares of land are today irrigated by canals of which the major ones are the Damodar Valley, the Kosi, the Tungabadhra and the Bhakra-Nangal projects. Each of these projects not only supplies water for irrigation, but also hydel power to industries. Some of these projects control floods as well. From the point of view of hectarage under irrigation, wells occupy a place of importance next to canals only. Although tanks irrigate only about 11 million acres of land, many areas of the Peninsular India would have remained without agriculture but for tank irrigation.

Notwithstanding the great progress in irrigation works and their extension throughout the country, there is much under-utilization of irrigation facilities. If India is to make herself self-sufficient in food and to raise raw materials for industries and export, irrigation facilities should be utilised to the maximum limit.

Questions and Discussion Topics

1. *Discuss the importance of irrigation to Indian agriculture.*
2. *What are the physical factors that are in favour of the development of irrigation in India ?*
3. *What are the various types of irrigation in India ?*
4. *It is said that there is an urgent need to provide drainage in irrigated areas to control floods and water logging. Explain.*
5. *Describe any two multi-purpose river-valley projects of India and explain how each has benefited the economy of its area.*

Chapter 6

Forests and Forest Products

A forest is a community of living trees. It provides a large variety of products and other utilities of great importance. India has 6.95 lakh sq. km of land under forests, i.e., about 22 per cent of the total geographical area of the country.

Distribution of Forests in India

The forests in India are very unevenly distributed. Region-wise, 50 per cent of the area under forests is in the hills and plateaus of Peninsular India, 20 per cent in the Himalayan Region, 12 per cent in the Eastern Ghats and Coastal Regions, 10 per cent in the Western Ghats and Coastal Regions, and about 7 per cent in the Northern Plains. The States of Madhya Pradesh, Assam, Orissa and Andhra Pradesh have the largest concentration of forests. The State-wise distribution of forests areas in 1962-63 is given below:

State	*Area Under Forest* (Thousand Hectares)
Andhra Pradesh	4921
Assam	6320
Bihar	3536
Jammu & Kashmir	552
Kerala	984
Madhya Pradesh	13450
Tamil Nadu	1900
Maharashtra & Gujarat	6252
Orissa	4050
Punjab and Haryana	332
Rajasthan	1304
Uttar Pradesh	3391
West Bengal	835

Types of Forests

There are more than 5,000 different species of trees in India, half of which are timber trees and the rest are shrubs and climbers. Broadly speaking, there are five types of forests in the country. These are:

(*i*) Arid country forests extending over a considerable portion of Rajasthan, the Punjab and Haryana. The most important tree is the *babul* or acacia.

(*ii*) Deciduous forests in the sub-Himalayan tracts and Peninsular India. Sal, teak, arjun, jarul, khair, siris, halda and similar trees are found in these forests.

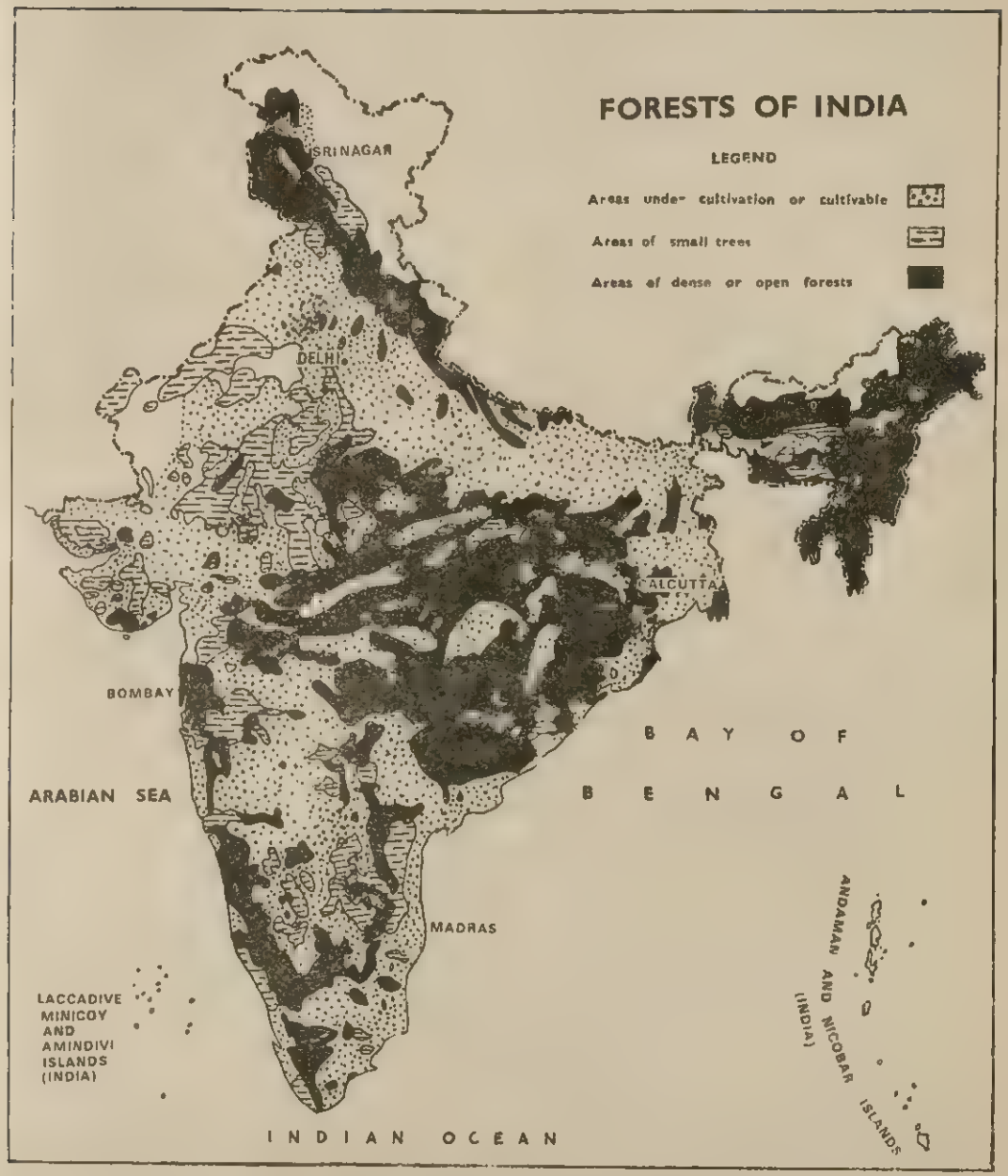
(*iii*) Evergreen forests in areas of heavy rainfall in the West Coast of Peninsular India and the Eastern sub-Himalayan tract. The common trees in these forests are bamboo, palm, chaplash, poon, toon, nahar, gurjan, rosewood and sissoo.

(*iv*) Hill forests in the Eastern Himalayas and Assam hills. Depending on the elevation and rainfall the hill forests contain such trees as oak, magnolia, deodar and pine.

(*v*) Mangrove or Littoral forests which grow in and around tidal creeks in river deltas e.g. the Sundarbans in the Ganga Delta. The common trees are sundari, pussur, etc.

The areas of forests composed of different types of trees in 1961-62 are as follows:

Type	*In sq. km.*
Coniferous (soft-wood trees)	43,481
Broad leaved trees:	
Sal	104,561
Teak	81,484
Others	465,487



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Importance of Forests

Forests, like rivers, are useful in various ways. The direct utilities of forests in India arise out of their products—timber, firewood, plywood, matchwood, and industrial raw materials. Timber is used for all constructional work—houses, bridges, dams, etc,—as well as for making furniture, boxes, crates, masts and decks of ships. The pulp produced from softwood (bamboo) and grass is the most important raw material for the manufacture of paper and rayon fibres. The forests yield a large variety of minor products like essential oils, resins, gums, medicinal herbs, flosses, edible plants, canes, and myrobalans. In addition, lac, honey, beeswax, bones, hides, horns, and insect fibres like eri and muga are available. The protective functions of forests include those of regulating air currents, moderating floods, conservation of soil and moisture, and increasing the soil fertility.

Indian forests provide employment for nearly a million people as wood-cutters, sawyers, carters, carriers and craftsmen. They supply fodder and sustain 32 million livestock. They are also a source of revenue to the Government and account for a part of India's exports.

Products of Forests

The current production of industrial wood in India is 8 million cubic metres as against the demand for 11 million cubic metres in 1965-66. It is estimated that there will be demand for 17 million cubic metres of wood in 1970-71.

In recent years there has been considerable progress in the production of timber in India mainly due to the opening of new roads and paths in the forest areas, increasing demand for timber for constructional activities under the Five Year Plans of development, and use of mechanical devices for felling trees and improved transportation. However, the per capita consumption of timber is still very low in India as compared to that in other industrialised countries. Per capita consumption of round wood in India is only 0.04 cubic metres as compared to 2.30 cubic metres in the U.S.A. The per capita forest area in India also works out to be only 0.2 hectares. The current production of industrial wood may go up by 1.5 million cubic metres with improved logging techniques and clearance of old forests.

The value of some of the minor forest produce in India was as follows:

1961-62	(In thousand rupees)
Bamboos and canes ..	2,41,86
Fibres & Flosses	55
Gums and resins	2,05,93
Others	7,62,27
Total	12,10,61

The minor products are: lac in parts of Bihar, West Bengal, U.P., Madhya Pradesh, Orissa and Assam Myrobalans (used in tanning and dyeing cotton and wool) in Tamil Nadu, Maharashtra, Bihar, Orissa and West Bengal; sandal-wood and sandal-wood oil in Mysore; cinchona in West Bengal (Darjeeling) and Nilgiri Hills; resin in Western Himalayas; and bamboos mainly in Assam, Tripura, Orissa and West Bengal.

Export of Forest Products

India exports teak, sandal-wood, rose-wood, lac, etc. to the U.S.A. and European countries. In 1962-63, the aggregate value of wood and timber exports amounted to Rs. 2 crores and that of lac also Rs. 2 crores.

Conservation Measures

The problem of indiscriminate destruction of forests through unregulated felling of trees, unrestricted grazing and exploitation of other forests products has been engaging the attention of the Government of India for

a number of years. The expanding cultivation of land has broken up in certain cases even the reserved forests. The process of deforestation (or denudation of forests) without considering the long-run interests of the country has brought about considerable deterioration of the physical and climatic conditions in various parts of the country. Loss of fertility of top-soils (soil erosion), the possibility of Rajasthan desert gradually engulfing adjoining areas, the drying up of springs and silting up of water channels are some of the consequences which will arise with greater intensity if timely action is not taken to check the rapid decline of forest lands.

Moreover, with the development of industries, the demand for timber and other forest products will continue to grow in the years to come. It has been estimated that the requirements of industrial wood will increase from 11 million cubic metres as in 1965-66 to about 17 million cubic metres in 1970-71. Since forests are replaceable only at a slow rate, it is desirable that the exploitation of forests and growing new forests should be properly planned and regulated. With regard to the output of minor forest products, the chief difficulty in organizing their commercial exploitation is the scattered distribution of the sources of supply. Some of the products like bamboo and lac are being reared and exploited on a satisfactory scale. Better methods of rearing, collection, extraction and marketing are required to be adopted in respect of all minor forest products.

Many forest areas of the Himalayas are inaccessible because of the rocky and steep slopes. The question of bringing timber and other materials from the forests to the roads, railways or rivers to be transported to the markets is one of the main problems of the timber industry. At present two methods are used for this purpose: (*a*) employment of bullocks, buffaloes and elephants as carriers of forest produce, and (*b*) floating timber rafts down the rivers during the monsoon rains to be dragged again to the saw mills. To provide a lasting solution to this problem, forest roads have to be linked with trunk roads and river landings.

To prevent the abuse of forest resources, regulate the exploitation of forests and increase the output of forest products, the Government of India and the State Governments have adopted a number of measures. New species of timber so far unacceptable to trade and new industries are being exploited in larger quantities. The Forest Research Institute at Dehra Dun is engaged in finding out suitable woods for aircraft construction, producing cheap printing paper, discovering woods suitable for use as battery separators, etc. The Government started an annual festival in 1950 to encourage the planting of trees in all parts of the country. The *Van Mahotsav*, as the festival is called, has now become a regular feature. A scheme has been adopted to check the advancement of the Rajasthan desert which includes creating a forest belt, oases of vegetation around important centres, establishing shelter-belts along selected roads and railways, and wind-breaks around agricultural fields.

In view of the importance of forests for their products and other direct and indirect benefits, several steps are being taken to conserve and extend forest areas and to promote more efficient utilisation of the available forest products. The three important schemes in the Fourth Plan are (*a*) the plantation of quick growing species, (*b*) the plantation of economic species (teak, cisoo and semul and (*c*) the rehabilitation of degraded forests. Provision has been made for new plantations over 84,000 hectares for teak, 16,000 hectares for bamboo, 24,000 hectares for matchwood, 8,800 hectares for wattal, 18,000 hectares for fuel wood and 1,30,000 hectares for other types of trees. It is now

recognised that for adequate provision of the future needs of timber, and for the prevention of soil erosion, floods, silting and choking of water channels, at least 60 per cent of the land area in the mountainous regions and plateaus should be under forests. In plains, at least 20 per cent of the land should be forested, and the overall proportion of forest land should be 33 per cent of the geographical area.

Questions and Discussion Topics

1. *What are the major types of forests in India? Where are they found?*
2. *Explain the utilities of forests in the economic life of India.*
3. *Why are conservation measures necessary for Indian forests?*
4. *Explain why in recent years there has been considerable progress in the production of timber in India.*
5. *What are the prospects of increasing exports of Indian timber to the world markets?*

Chapter 7

Livestock

Importance of Livestock

Livestock means domestic animals like horses, cattle, sheep, camels and pigs. Such domestic animals are reared in India on a large scale for three primary purposes: (*a*) for milk and milk products, beef and mutton; (*b*) to obtain raw materials as wool, leather, bones; and (*c*) to provide draught power for farm operations and transport. Bullocks, camels and buffaloes are used to draw ploughs for cultivation of land, and in India where mechanization of agriculture is uncommon, the role of animals in this regard is very important. The fact that a very large proportion of Indian population is vegetarian, the protein contents in their diet are obtained from milk and milk products. To a large extent, agriculture and rearing of livestock form an integrated industry in many parts of India as it ensures a better utilisation of farm bye-products and also a fuller employment of cultivators throughout the year.

Types of Livestock

India has the largest bovine population in the world. According to one estimate, India possesses a quarter of the total world population of bovines. The 1961 census of livestock gives the number of domestic animals in India as follows:

	(Millions)
Cattle	.. 175·5
Buffaloes	.. 51·2
Sheep	.. 40
Goats	.. 60·8
Horses & Ponies	.. 1·3
Other Livestock	.. 7·2
Total	.. 336·0

Cattle

India possesses the largest number of cattle in any country in the world. Inspite of adverse climatic conditions, the contribution of the bovine population towards India's national income is fairly high. It is estimated that the net income from bovine animals after deducting expenditure on maintenance is about Rs. 650 crores, a large part of which is derived from cattle. Income from milk and milk products alone comes to about Rs. 300 crores.

There are many breeds or types of cattle in India. The breeds vary from one area to another. As our country is vast, soil and climatic conditions are of a wide range. Cattle either get used to an environment or remain in good form only in the environment to which they are used to, from the very beginning. There are thus 26 breeds of cattle and about 6 breeds of buffaloes in India. India is the only country where buffaloes have been domesticated and their milk used. The non-descript breeds are many and generally short in size and low in production. U.P. has the largest number of cattle with 26 million, followed by Madhya Pradesh 25 million, Bihar 16 million, Maharashtra 15 million, Rajasthan 13 million, Mysore 10 million and Tamil Nadu 11 million.

Good quality cattle are found mostly in dry areas, like Haryana, the Punjab, Rajasthan, Gujarat, and parts of Maharashtra, Tamil Nadu, Mysore and Andhra Pradesh. In hilly areas, where the rainfall is heavy, the quality of the cattle is generally poor.

The cattle in India are irregularly distributed. The present cattle population in India is in excess of the available supplies of fodder. Cattle are naturally ill-fed. At least one-third of the cattle population may be regarded as surplus. Owing to the increase in the requirements of food for the human population, areas, where grazing was possible, have steadily diminished. This has led to poor feeding. Unless adequate feed supplies are available for cattle, their contribution to agriculture and food is bound to be affected adversely. There is also the need to increase the number of quality-cattle. The important cattle-breeding areas are Madhya Pradesh, Andhra Pradesh, U.P., Mysore and Gujarat.

Sheep

Sheep occupy a paramount place in the agricultural economy of the world. Apart from utilising the waste lands and clearing weeds from the fields, they supply men with food and material for clothing. Thus the production of wool and meat adds to the farmers' income. Moreover, droppings from sheep also enrich the soil. Sheep are by nature extremely docile and can be made to thrive in varying climatic and agricultural conditions. Dry pastoral conditions have been found more suitable for the rearing of flocks yielding superior wool. The mutton breeds, which yield wool of inferior quality, are generally found in areas of heavy rainfall.

India stands fifth in sheep population with her 40 million sheep. Sheep in India are reared in Andhra Pradesh, Rajasthan, Tamil Nadu, U.P., Maharashtra, Gujarat, Jammu and Kashmir, Bihar, and the Punjab and Haryana. About 40 per cent of the sheep are found in Andhra Pradesh and Rajasthan.

The sheep raising tracts of India may be classified into three regions as follows:

(*i*) The Northern Region comprising Kashmir, Himachal Pradesh, the Punjab, Haryana and U.P.

(*ii*) The Western Region comprising Rajasthan, South-East Punjab, Western U.P. and Gujarat.

(*iii*) The Southern Region comprising Southern Maharashtra, Mysore, Tamil Nadu and Andhra Pradesh.

The Indian sheep is inferior to that of Australia and of South Africa as a mutton or wool producer. The wool of Northern India is white and of fair quality while in Peninsular India, it is grey, short and coarse. The average annual production is a little above 32,000 tonnes. Rajasthan produces about 13,000 tonnes of raw wool. The next important producer is Gujarat with 3,200 tonnes. Andhra Pradesh occupies the third position with about 3,000 tonnes. A good deal of the wool which comes to the Indian market is dead wool, i.e., what has been removed from the carcases of slaughtered sheep and not shorn. The need for improving shearing efficiency in India is urgent.

The average yield of wool per sheep is about 1 kg and this can be raised to about 2.7 kg with improved varieties of sheep. The demand for wool comes from cottage industries for carpets and floor rugs, from woollen mills for blankets and manufacture of clothing material and knitting yarns and from other industries for the manufacture of shawls, tweeds, etc. There are sheep breeding farms and wool extension centres in Himachal Pradesh, Maharashtra and Madhya Pradesh.

The average annual export of raw wool is about 23 million kg, of which 16 million kg are carpet wool and about 7 million kg are semi-processed wool. In 1964-65, the export of raw wool earned about Rs. 9 crores in foreign exchange. A frequent complaint of the foreign consumers about Indian wool is the presence of excessive foreign matter such as sand. Accordingly steps are being taken to ensure correct shearing as well as systematic grading of wool.

Goats

The usefulness of the goat otherwise known as the "poor man's cow" is a debatable subject in the field of agriculture and animal husbandry in India. Although valued for the milk it gives for the children, the old and the sick, it has distinctive food habits itself. Goats are a menace to young forests. Perhaps it has been forced by circumstances to acquire this habit. Deprived of suitable grazing grounds by the growing human population and livestock, goats have to fall back upon whatever comes in their way.

Goats are maintained for milk, meat, manure and hair. Goat's milk is highly valued for human consumption.

There are various types of goat hair obtainable in India. Mohair is the famous yarn woven from the long lustrous hair of the Angus goat. Pashmina is obtained from Pashmina goats or Kashmiri goats. However, the hair of the common goat is seldom used in the manufacture of textiles. It is used quite often, in making ropes, bags, and blankets.

Goat skins form a major item in our export trade. It has been estimated that nearly 274.19 lakhs of goat skins are produced in India each year. Of this, nearly 233.12 lakhs are from slaughtered animals and 41.7 lakhs from fallen ones.

Mules, Horses and Camels

Mules and horses are used in India mostly for drawing carts. There are 2 million such animals in India and these are found chiefly in U.P., Madhya Pradesh, Bihar, Gujarat and Maharashtra. Camels are mostly confined to the Punjab, Haryana and West Rajasthan. In these areas, camels are largely used for ploughing and as draught animals.

Animal Products in India

Animals products in India are hides, skins, bone, wool, meat, milk and milk products.

Hides and Skins

Hides and skins are used for making harnesses bags, suitcases, trunks, machine belts, automobile tops and seats, cases for guns, shoes and gloves. The term hide denotes the skin of cattle, horses and camels, while the term skin is restricted to those of calves, sheep and goats. In India, the hides and skins are mostly collected from the slaughter houses. West Bengal and Tamil Nadu are the largest producers of cattle hides, Madras for buffalo hides and sheep skins, and U.P. for goat skins, followed by West Bengal and Bihar. The leather producing centres in India are Kanpur, Agra, Calcutta, Delhi and Madras. The total estimated supply of raw hides in India is about 200 lakh pieces. Of this, nearly 40 lakh pieces or 20 per cent are exported raw or after tanning. The remaining 80 per cent are consumed by small and large tanneries for preparing leather suitable for different types of articles used in the country. About 37 million pieces of skin are obtained annually from goats and sheep.

Indian hides and skins are purchased by the U.S.A., Germany, the U.K., France, Belgium, Iraq, and Burma. In 1964-65, India imported 329 lakh kg of leather, hides and skin and earned Rs. 37 crores of foreign exchange.

Milk and Butter

The output of milk in India was 22 million tonnes in 1961. By the end of the Third Plan, the milk production was expected to go up to 25 million tonnes. More than 50 per cent of the milk is obtained from the buffalo. India stands second in the volume of milk production, her output being exceeded only by the U.S.A. The yield of milk per head of cattle in India is very erratic ranging between 5 and 17 litres, per day. U.P. contributes about 20 per cent of the milk supply followed by Bihar (12 per cent), Tamil Nadu, (10 per cent) and Maharashtra

(6 per cent). The average consumption of milk per head per day ranges from 1/16 litre in Assam to 1 litre in the Punjab and Haryana.

Of the total milk produced in India, about 38 per cent is estimated as being for consumption as fluid milk, about 42 per cent for *ghee*, and the rest for *khoa*, butter, curd and other products. The progress of dairy industry in India has been very slow on account of scattered and small-scale milk production, inadequate transport facilities in most parts of the country, dependence on imported plant and machinery for milk processing, and shortage of technical personnel. The dairy development activities in India are now being pursued with vigour in a number of places. At Anand in Kaira District of Gujarat, a large butter factory has been started with a capacity of 4,600 kg of butter a day. Its tinned butter has a market throughout the country. Modern dairies have been set up in Bombay, Delhi, Poona, Kudgi, Kurnool, Guntur, Kodai Kanal and Haringhata.* Milk product factories are located at Amritsar, Moga and Rajkot. In U.P., there are dairies at Aligarh, Kanpur, Lucknow, Varanasi and Allahabad.

In the Fourth Plan period, encouragement will be given for setting up of milk plants and rural dairy centres, expansion of indigenous manufacture of dairy machinery, and expansion of milk supply schemes. It is proposed to establish 26 milk product factories, 198 rural dairying centres and 12 cattle feed compounding factories.

Ghee

Ghee has considerable demand in India and is "prepared by practically every household by heating butter over a slow fire until an oil is formed that rises to the surface while the refuse settles down as sediment." Ghee is used in the preparation of food and sweetmeats. Buffalo butter gives greater yield of ghee than that of cow. The ghee-producing areas are U.P., Rajasthan, Madhya Pradesh, the Punjab and Haryana. The annual production of ghee in India is about 5.5 million quintals.

Of the total ghee production, nearly 30 per cent is retained by the producers for domestic consumption and the rest is marketed. Ghee is also sent to Malaya, Ceylon, South Africa, Mauritius and Hong Kong where a large number of Indian emigrants have settled. India also imports, in normal years, about 26,000 quintals of ghee, mostly from Nepal.

Recently the ghee trade has suffered greatly by the competition of vegetable oils. The establishment of ghee-grading centres is necessary for getting ghee graded and tested for purity.

Poultry

Poultry development gives a substantial source of supplementary food for the nation, a gainful subsidiary occupation to a large section of the people and rural employment, especially among educated farmers. Poultry production has tremendous potentialities in India because of (*a*) the efficiency with which the poultry convert food-stuffs into human food, (*b*) the small investment required to get it started, (*c*) its suitability as a family enterprise, (*d*) the small area required, and (*e*) quick financial returns. In 1960 there were 130 million poultry birds. The importance of poultry in India may be judged from the fact that, domestic consumption apart, 60 per cent of hen-eggs and 80 per cent of duck-eggs are marketed every year valued at over Rs. 5 crores, the value of birds themselves being estimated at Rs. 7½ crores. The per capita availability of eggs per annum in 1960 was about 18 in India as against 296 in Canada. The average indigenous hen

* The Aarey colony in Bombay is regarded as the best among the Indian dairies.

produces about 60 eggs per year in this country, as against 120 in many other countries. Commercial hatcheries and regional poultry farms are being set up in many States which will increase the average egg production. A factor in poultry development is the loss which the poultry breeder frequently suffers from the outbreak of diseases. A large proportion of the eggs produced during the hot weather are lost on account of the lack of proper preservation including cold storage. During the Fourth Plan, poultry will be developed around urban consuming areas with provision for transport, distribution and processing of eggs and poultry meat. Attention will be paid to the development of cold storage, refrigerated transport, poultry dressing plants and organisation of feed manufacturing units.

Broadly speaking, cattle are reared throughout the country, and in a few places the presence of surplus cattle has led to deterioration of pastures. Sheep have the advantage of yielding a product—wool—which is not perishable and can be easily transported. Sheep can also thrive on poorer pastures. The Government has undertaken several measures to improve the quality of cattle and sheep through the spread of veterinary clinics, preservation of pasture lands and improvements in breeding.

Questions and Discussion Topics

1. *What are the principal animal products in India?*

2. *Write notes on:*

   a) Sheep rearing in India.

   b) Dairy farming in India.

3. *Discuss the potentialities of poultry production in India.*

4. *Explain why agriculture and rearing of livestock form an integrated industry in many parts of India.*

Chapter 8

Fisheries in India

Importance of Fisheries

India has 5,689 km of coastline and several million hectares of inland waters. Thus, India's fishery resources are large. The importance of fishing lies in its immense potentiality in augmenting the food resources of this country. As a source of food, fisheries stand almost equal to agriculture and animal husbandry. When land cannot produce enough to feed a country's population, its water must be exploited in an effort to find more food.

Chief Sources of Fisheries in India

The chief sources of the fisheries in India are the coastal margins of the sea, rivers, estuaries and backwaters for marine fish, and rivers, canals, tanks, inundated tracts, etc., for freshwater fish.

Although the maritime and riverine fisheries at present occupy a very minor place in the national economy of India, the industry contributes about Rs. 60 crores annually to the national income. About 75,000 fishing crafts which ply along the country's extensive coastline provide a livelihood for about one million fishermen.

Production

The requirements of the fish-eating population in India are estimated at 4.5 million tonnes. The present production, therefore, falls short of demand by about 60 per cent. Fortunately, however, Bay of Bengal and the Arabian Sea are rich enough to meet this requirement. The potentialities for the development of fisheries in India are great. The exploitation has been delayed because of the absence of adequate mechanised fishing crafts. Also, much time is taken to return from the fishing grounds.

Fish Production in India

(in thousand metric tonnes)

Year	*Marine*	*Freshwater*	*Total*
1955	586	240	826
1956	707	289	996
1957	875	358	1,233
1958	755	309	1,064
1960	1,050	350	1,400
1963	655	391	1,046

Of the total production of fish in 1963, about 705,000 tonnes were marketed fresh and 288,000 tonnes were cured. In 1965-66 production of fish was 1.5 million tonnes.

Areas of Production

Fishing Grounds: The total area of the sea which lies between the coast and 100 fathom line is approximately 42970 sq. km. At present, sea-fishing is carried on within 10 fathoms in the sea. The sea-fisheries are confined to the coastal waters from the shore in Gujarat, Kanara, Malabar Coast, Gulf of Manar, Madras Coast and the Coromondal Coast. All major marine fisheries are confined to comparatively shallow waters over narrow belts of continental shelves and slopes. In these areas also, the good fishing grounds occupy only a fraction of the entire belts between the coastlines and the continental slopes. The greater depths

beyond the 100 fathom line are almost barren from the standpoint of commercial fisheries. The unsuitability of the vessels, limitations due to climate, absence of suitable harbours and the lack of refrigeration, and transport and marketing facilities are serious handicaps in the way of the development of the marine fisheries in India. The fishing season for the marine fisheries lasts for about five months from September to January. As a result, the supply varies between seasons considerably. For the rational utilization of the sea, it is necessary to ascertain the behaviour of water by studying the physical, biological and chemical aspects of oceanography. So far, very little is known about the characteristics of the coastal waters of India. Most varieties of fish caught along the coasts are edible. The principal catches are herrings, mackerel, prawns, jew fish, cat-fish, mullets, pomfrets and Indian salmon. Mackerel accounts for over a third of the total catch and is found chiefly on the west coast of Tamil Nadu, Kerala, Maharashtra and Gujarat coast. Herrings account for over 15 per cent of the total catch. Prawns occupy the third rank with 9 per cent. Pomfrets, mullets and the Indian salmon, although very popular, are caught only in comparatively small quantities, the respective percentages being 1.7, 1.9 and 1.3. The type of fishing implements includes drift nets, cast nets, stationary nets, etc. In the sea, fishermen catch fish very near the shore and do not spread their nets beyond a distance of 8 to 10 km.

Landing of Marine Fish, 1964

(in thousand tonnes)

Kerala	.. 318	Mysore	..	..	104
Tamil Nadu	.. 131	Gujarat	..	..	93
Maharashtra	.. 130	Andhra	..	..	72

Deltaic Fisheries

The Deltaic fisheries are confined to the estuaries, backwater areas, lagoons, etc., and generally constitute very rich potential fisheries. While the fisheries in some areas, such as the Chilka Lake in Orissa, backwaters in Madras and Kerala are extensively exploited, those on the extensive deltaic area of the Sundarbans and the delta of the Mahanadi are hardly tapped. The backwaters of Kerala covering about 300 square miles offer excellent grounds for development of estuarine fish-farming for rapid-growing species of mullets, bhetki, pearl spot, etc.

The estuaries of the Mahanadi and the Ganga stretching from Puri to Hooghly contain cock-up, hilsa, pomfrets, prawns, catla, cat-fish, rohu, etc., which are caught by trawl-type nets, drift nets and gilling nets, casting nets, bag nets, etc.

Fresh Water Fishing Grounds

The river fisheries at present constitute the mainstay of inland fisheries of the country and are carried out in rivers, canals, irrigation channels, tanks, ponds, etc. The extensive expanses of the Ganga in U.P., Bihar and West Bengal, the Brahmaputra in Assam, the Mahanadi in Orissa, the Narmada, the Tapti, the Godavari, the Krishna and the Cauvery systems are the main areas. Fishing in the Ganga system is very important. In these parts, people always prefer fresh water fish. The estimated marketable surplus in the country is in the neighbourhood of 160 million kg of fish. West Bengal leads both in catch of fish as well as in value with 29 per cent and 36 per cent respectively. Bihar is a close second and Assam third in regard to the available surplus and the three States of West Bengal, Bihar and Assam account for nearly 72 per cent of the total freshwater fish marketed in India. Tamil Nadu, the leading State in the production of sea-fish, catches only 4.7 per cent of the Indian total so far as freshwater fish is concerned. The Mahanadi in Orissa and the Ganga and its tributaries in U.P. yield 8.3 and 3.8 per cent respectively of the total catch.

Utilization

A great obstacle in the development of the fish industry in India is that people have been so far used to only certain varieties of fish. Wide publicity and propaganda are necessary to enlighten the people as regards the nutritious value of fish of new varieties. The average per capita consumption of fish in India is 1.8 kg per annum, West Bengal being the leading consumer having 2.7 kg per capita consumption. In the Punjab, it is 0.4 kg and in Bihar, it is 0.9 kg.

One half of the total production is consumed as fresh fish, one-fifth is cured by salting, another one-fifth is simply sun-dried, while about 10 per cent is converted into fish fertilizers.

There is practically no fish-canning in India: Difficulties in developing this industry are the absence of regular supplies of fish, lack of good and cheap containers and the short canning season.

Mechanisation of fishing crafts has been introduced to a certain extent in Tamil Nadu Kerala, Mysore, Andhra Pradesh and Orissa. Fish is a highly perishable commodity and the climate is sub-tropical. Hence, the great need for cold storage, processing and canning. At present, the fresh fish is consumed in areas located near the coast or in the neighbourhood of landing places, because of the transport difficulties. Refrigerated railway wagons and freezing facilities for movement of fish in good conditions to consuming areas will ensure a balance between demand and price. The Government of India has set up a chain of well-equipped pilot fishing stations along the coast of India at Mangalore, Bombay, Cochin, Vishakhapatnam and Port Blair. Each station has cold storage facilities and refrigeratory motor vans for carrying fish to inland market by road. The major ports of India are so congested that special facilities for fishing vessels are not easy to make. Special fishing harbours in India are urgently needed.

The industrial products from fish are fish oil, fish meal, fish manure, fish maws and shirk fins.

Export

Fish is exported in preserved form to Ceylon, Burma and countries in the Far East. Its export depends, to a certain extent, upon the nature of the fishing season along the south-west coast of India. A favourable season results in an increased exportable surplus. Tamil Nadu and Kerala are the chief exporting areas. Ceylon is the principal buyer, the average of her share being 80 per cent, followed by Burma. In 1964-65 India earned Rs. 6.8 crores from the exports of fish and fish preparations. The importers of frozen and canned prawns are the U.S.A., Australia, the U.K., and Canada.

Import

Though there is practically no import of raw fish into India, considerable quantities of preserved fish are imported. The value of imported fish in 1964-65 was Rs. 3.3 crores.

Conclusion

Considering the importance of fishing as a source of food and for employment in the coastal regions, the Government of India has chalked out a series of programmes to develop the industry so as to raise its production to 1.8 million tons by 1970-71. The programmes include the mechanisation of existing fishing crafts, commercial fishing on high seas by modern vessels, installation of facilities for storing, freezing and processing fish and improved marketing. All these developmental measures should increase its production and export.

Questions and Discussion Topics

1. *Give an account of the sources of inland fisheries in India.*

2. *Why are the fisheries in India not highly developed?*

3. *"When land cannot produce enough to feed a country's population, its water must be exploited in an effort to find more food". Examine this statement with reference to India.*

4. *Examine the present position and the future prospects of the fishing industry in India.*

Chapter 9

Mineral Resources

Importance

Minerals play a very important role in modern life and civilisation. With the scientific discoveries and speedy progress of technology, the uses and importance of minerals have increased manifold over the last 150 years. Heavy machinery and equipment, locomotives, automobiles and carriages, buildings, factories, bridges, dams, etc., are all dependent on basic minerals.

Classification

India has large deposits of a variety of minerals. Of the various minerals in India, the most important are coal, iron, manganese, mica, aluminium, limestone, silica (glass), gold, etc. The variety of minerals are sufficiently large to make India an industrially advanced country.

Minerals can be classified into four main groups:

(*i*) Ferrous metals, e.g., iron, manganese, tungsten.
(*ii*) Non-ferrous metals, e.g., copper, lead, zinc, aluminium, gold, silver.
(*iii*) Non-metallic minerals, e.g., mica, limestone and dolomite, magnesite refractory minerals etc.
(*iv*) Power resources, e.g., coal, petroleum, atomic minerals.

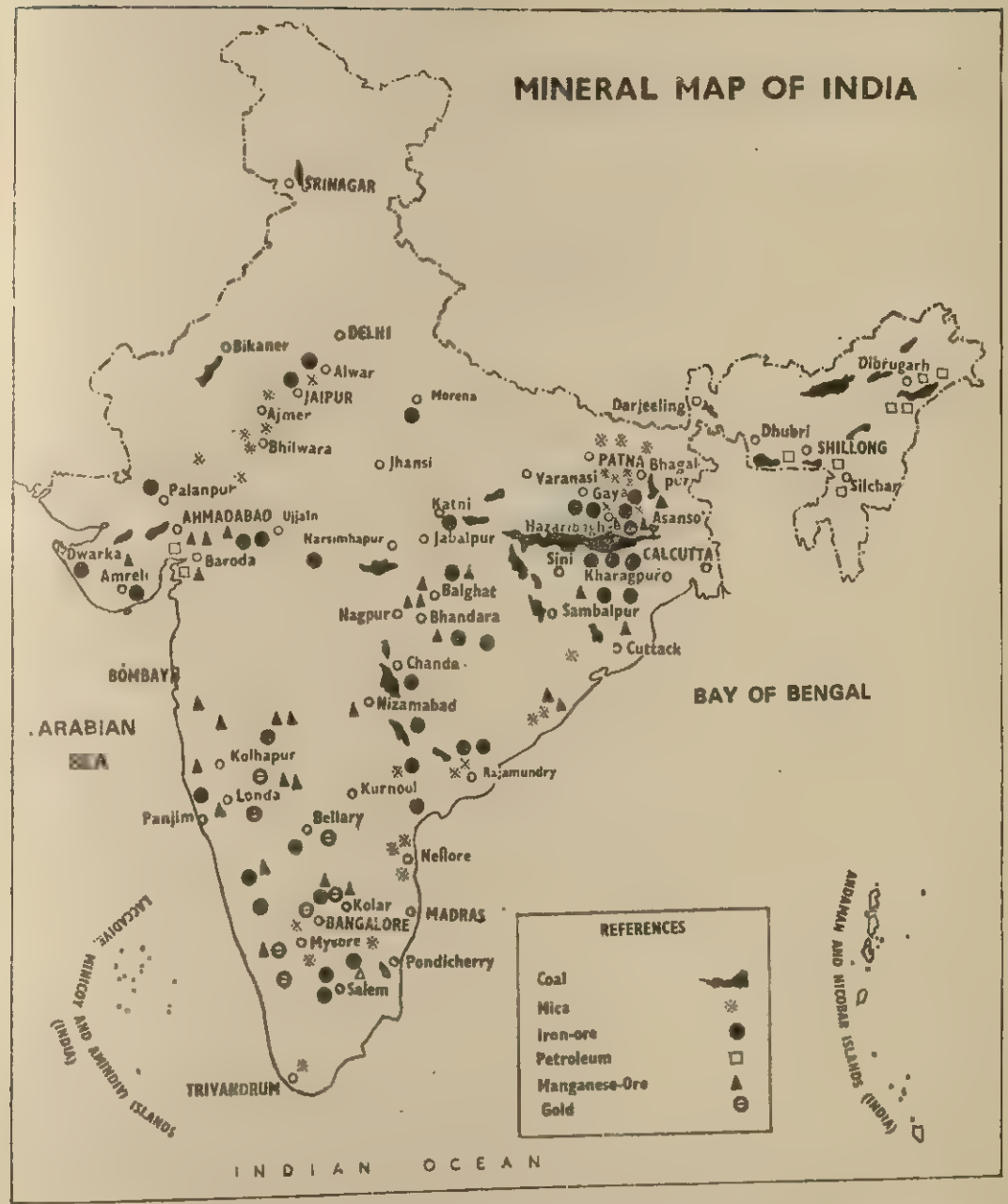
Production

The following table shows the figures in mineral production between 1951 and 1965:

Mineral Production

Commodities	Unit	1951	1961	1965
Coal	million tonnes	34.9	56.1	69.5
Iron Ore	million tonnes	3.7	12.3	16.9
Manganese Ore	million tonnes	1.3	1.2	1.5
Limestone	million tonnes	3.0	14.6	19.9
Bauxite	'000 tonnes	68	476	706
Copper Ore	'000 tonnes	375	423	468
China clay	'000 tonnes	70	383	498
Chromite	'000 tonnes	17	49	60
Gold	'000 kgs	7.0	4.9	4.1
Gypsum	'000 tonnes	207	865	1148
Ilmenite	'000 tonnes	228	174	30
Kyanite	'000 tonnes	43	27	37
Lead concentrates	'000 tonnes	1.8	5.5	5.5
Magnesite	'000 tonnes	119	210	239
Mica (crude)	'000 tonnes	N.A.	28.3	23.0
Salt	million tonnes	2.8	3.5	4.7
Steatite	'000 tonnes	34	98	149
Zinc concentrates	'000 tonnes	2.1	9.3	9.6

N.A.: Not Available.



The demarcation of the Gujarat-West Pakistan Boundary is in accordance with the Indo-Pakistan-Western Boundary case. Tribunal Award is in progress (1969).

Ferrous metals

Iron

Iron is by far the most important of all metallic minerals. Without iron, the extensive use of machinery and the tremendous mechanical power would not be possible and modern transport systems would be difficult to imagine. In fact, modern civilization based on large scale manufacture and distribution of goods over vast areas is closely connected with the use of iron and steel. Agricultural implements, industrial machinery, power generating plants, automobiles, railway locomotives, ships and all constructional work of buildings, factories, bridges and dams need iron and steel. Many consumer goods of daily use are also made of iron and steel—electric fans, sewing machines, bicycles, steel furniture, almirahs, shelves, brackets, etc. No wonder that iron and steel are often regarded as more important than gold and silver.

The value of iron ore deposit depends not only on its richness in iron, but also upon its location and the ease or difficulty of mining. India is fortunate in this respect because she has rich iron mines in close vicinity of the coalfields. Dolomite and limestone necessary for smelting iron to produce metallic iron and steel are also found nearby.

There are four different types of iron ores found in India—magnetite, laterite, clay iron stone and haematite. The haematites are the most valuable iron ores in India. Both in quantity and quality they exceed other deposits of the same kind elsewhere in the world. India is the ninth largest producer of iron in the world. Though deposits of iron ore of good quality are found in many parts of the country, the most important fields are confined to Bihar and Orissa. Other States which produce iron ore are Maharashtra, Madhya Pradesh, Tamil Nadu and Mysore.

In 1965-66 the production of iron ore in India was about 16.9 million tonnes compared to only 3.7 million tonnes in 1951. The greater part of the output comes from Bihar and Orissa. Singhbhum in Bihar is the largest iron ore producing area in India, and rich deposits of haematite are found in Pansira, Buru, Gua, Buda Buru and Noamundi. This area produces about 40% of the total output. Orissa raises about 36% of the total production. Mayurbhanj in Orissa contains large deposits of high grade iron ore in three main fields—Gurumahisani, Sulaipat and Badampahar. The most valuable deposits occur in the chain of hills extending over 30 miles from Kompilai in Bonai (Orissa) to the borders of Bihar. Kiriburu ironfields in Orissa are now being worked with the assistance of Japanese experts. Keonjhar fields, also in Orissa, possess two groups of mines—one in Bagia Buru ridge and the other in the north-eastern part.

In Maharashtra two fields at Lahora and Pipalgaon in Chanda district produce about 800 tonnes of iron ore a year. Ratnagiri district has a great possibility of producing iron in substantial quantities. Madhya Pradesh, Tamil Nadu, Mysore and Andhra Pradesh are the other states which produce iron in relatively small quantities.

India's resources of high grade iron-ore (60% metal content) are said to be the second largest in the world next to those of Brazil. The estimated reserves of haematite and magnetite ores, according to the Government of India, are 4500 million tonnes and 463 million tonnes respectively. However, probable reserves of iron ore are said to be 12,250 million tonnes of haematite and 1,200 million tonnes of magnetite ores. With an increase in our demands of iron and steel, the production of this metal has increased more than three times during the last 12 years. The Fourth Plan has estimated the demand for iron ore in 1970-71 at 54 million

tonnes—29 million tonnes for iron and steel and 25 million tonnes for export.

Iron ore has also become an important source of foreign exchange earner to India since 1950 and in 1965-66, it earned Rs. 42.1 crores. Japan buys half of the total exports of iron ore from India. Other customers are Poland, Yugoslavia, Hungary, Italy and West Germany.

Manganese

Manganese is used for hardening iron and steel, in the manufacture of block enamel and bleaching powder, and in the electrical and glass industries. Its most important use is as a ferro-alloy metal in making carbon-steel, and there is no other substitute for it. India is the third largest producer of manganese in the world. The State of Madhya Pradesh is the foremost producer of manganese ore in India. The mining areas are Balaghat, Chhindwara and Jabalpur. The State raises nearly 55% of the total output. Other producing States are Orissa, Maharashtra, Mysore, Andhra Pradesh and Bihar. In Orissa, Gangapur, Keonjhar Bonai and Ganjam are the important areas producing manganese ore. But almost half of the deposits of Orissa are of low grade. Maharashtra has large deposits of manganese in the districts of Nagpur and Bhandara. The manganese fields of Mysore are widely distributed. The output is however small and comes mainly from North Kanara, Chitradurga, Kadur, Shimoga and Tumkur districts. In Andhra Pradesh, it is mined at Visakhapatnam and Srikakulam. The production of Bihar comes from Kalhan and Singhbhum areas, particularly from Chaibasa.

India produced 1.5 million tonnes of manganese ore in 1965-66. Orissa and Madhya Pradesh are the States which raised the maximum quantity of manganese with an annual output of about 450 thousand tonnes.

With industrial progress and increase in the production of steel there has been a steady rise in the consumption of manganese in India. Even then, the iron and steel companies now require only 300,000 tonnes per year, leaving a large quantity of manganese for export. In fact, manganese has been an important export item of India for a long time. In 1965-66, the country earned about Rs. 100 crores from the export of manganese ore to the U.S.A., Japan, the U.K., and France. The main difficulties as regards exports are (*a*) competition from Brazilian exporters, (*b*) relatively high costs, (*c*) high rates of royalties to be paid by mining companies and (*d*) the absence of a suitable long-term export policy.

The reserves of manganese ore in India are by far the largest in the world. But a large part of the reserves are of poor quality. It has been estimated that out of 180 million tonnes of reserves only 40% are of marketable grade.

Chromite

Chromite has considerable demand for the manufacture of Chromite steel, Ferro-Chrome and Chromite bricks. It is also required for producing chromium salt which is needed in dyeing and tanning. India produces about 60,000 tonnes of Chromite a year. But actual output has often varied in accordance with demand. In 1955, the production was about 91,000 tonnes, in 1964, it fell to 35,000 tonnes and in 1965, it increased to 60,000 tonnes. Mysore is the main producer of Chromite in India. The most important fields are at Shimoga and Hassan. These areas supply nearly 35% of the Indian output. Bihar is another important producer, Chromite deposits being found in Ranchi and Bhagalpur districts. Orissa (Keonjhar district), Tamil Nadu (Salem district), Andhra Pradesh (Krishna district) and Maharashtra (Ratnagiri and Sawantwadi) also produce

chromite. Practically the whole output is exported mainly to the U.K., Norway, Sweden, Germany and the U.S.A. The reserves of chromite have been estimated at 2.3 million tonnes. The greater part of the reserves are in Andhra Pradesh, Orissa and Mysore.

Tungsten

Tungsten or wolfram (the ore of Tungsten) is used in the manufacture of hard steel and electric wires for bulbs. Wolfram deposits occur in small quantities in Bihar (Singbhum district), Rajasthan (Marwar area) and Madhya Pradesh. The annual production is around 50 tonnes only.

Non-ferrous Metals

Copper

Copper is usually found in nature in combination with silver, gold, iron, lead and sulphur. It is mainly used in the electrical industries as a conducting medium, manufacture of telephone and telegraph equipments, in ship-building and railways. It is also mixed with zinc, tin and nickel to produce the alloy-metals—bronze, brass and German-silver. Copper consumption in India is low as compared to that of the U.S.A. and the U.K. The present demand for metallic copper is about 180,000 tonnes but the actual production comes to a little over 9,000 tonnes, which can be obtained from about 450,000 tonnes of copper ore. The ordinary grades of Indian copper ore contain 2% of metallic copper. The Fourth Plan has estimated the requirements of copper in 1970-71 at 250,000 tonnes.

The greater part of copper deposits in India is found in the Singhbhum and Hazaribagh districts of Bihar. The important fields are in Mosabhani, Ghatsila and Dhobani. Copper ores also occur in Khetri and Daribo in Rajasthan, Garhwal district in U.P. and Anantapur in Andhra Pradesh. It has been estimated that Khetri area has 28 million tonnes of copper reserves. Along the outer Himalaya, a belt of copper-bearing rocks runs through Kulu, Kangra, Bhutan and Sikkim. These deposits are not commercially exploited owing to lack of adequate communication facilities. In 1965, India produced 468,000 tonnes of copper ore. This production can hardly meet one fifth of her requirements of metallic copper. With the rise in demand, India has become increasingly dependent upon imports of copper from abroad. The U.S.A. supplies about one-third of our imports followed by the U.K., Canada, Chile and Belgium.

Gold

Gold is mainly used in India for ornamental, medical and chemical purposes. But the quantity of gold produced is very small, being only 2% of the world output. The chief centre of gold mining in India is the Kolar Goldfields in the Kolar district of Mysore. It produces about 99% of Indian gold and employs more than 23,000 workers. There are four principal mines in this field—the Champion Reef Mine, the Ooregam Mine, the Kolar Mine and the Nandi Drug Mine. The Kolar Goldfields is owned and operated by the Government of India. So far, the Kolar Goldfields has produced about 24 million ozs. of gold. A small quantity of gold is also produced from the Bellara and Hutti mines in Mysore which are operated by the Government of Mysore. Anantapur in Andhra Pradesh contains several large quartz reefs. But it does not produce any gold. Gold deposits have also been found in certain parts of Salem and Chittur districts of Tamil Nadu. Alluvial gold is found with sand in many rivers in India and is recovered by local inhabitants in Orissa, the Punjab and Haryana (Ambala district), U.P. (Bijnor district) and Assam. In 1965, India raised about 41,000 kg of gold.

Silver

Silver is used in India for the manufacture of ornaments, utensils and coinage. India is the largest consumer of silver in the world. It is obtained chiefly in combination with gold and copper. Production of silver takes place in Mysore (Kolar Goldfields) and Bihar (Manbhum district). Anantapur (Andhra Pradesh) was once an important producer of silver but does not produce it any longer. The supply of silver in India is almost sufficient to meet its requirements. A small quantity is only imported from the U.K., Belgium and West Germany. The annual production of silver in India is about 6,000 kilograms.

Antimony

Antimony is an alloy-metal which is mixed with softer metals to harden them. It is of strategic importance. Small deposits of antimony ore occur in Lahul and Kangra districts in Himachal Pradesh and Chitradurga district in Mysore. The present output of metallic antimony in India is only about 900 tonnes a year. It is produced from imported ores which mainly come from Bolivia. A small quantity is imported from Czechoslovakia, Iran and Australia.

Lead

Lead is used in electrical and chemical industries and in making paints. The production of lead ore in India is not sufficient for the requirements of the country. The annual demand of lead normally is about 30,000 tonnes while the production is now about 6,000 tonnes. Thus, India has to import lead from Australia and Burma. The principal lead mines in India are in Udaipur and Jaipur districts in Rajasthan. Reserves of lead ore are estimated at about 11 million tonnes.

Zinc

Zinc is widely used in spraying, zinc plating to resist corrosion and in textile and paint manufactures. Zinc occurs in combination with lead. Zawar mines in Udaipur district of Rajasthan are the only source of zinc ore in India. The present requirement of zinc ore is about 85,000 tonnes a year but India produces only 9,000 tonnes of zinc concentrates. Thus a large quantity of zinc has to be imported. The main sources of import are Rhodesia, Australia, the U.S.A., and Holland. In the absence of a zinc smelter in India, even the zinc concentrates produced in the country have to be sent to Japan for smelting. The requirements of zinc in 1970-71 have been estimated at 117,000 tonnes.

Bauxite (Aluminium Ore)

Aluminium which is obtained from bauxite is a strategic metal. It has the most important use in the manufacture of aircraft. It is also used in manufacturing electrical goods, building materials, vehicles, domestic utensils, photographic materials and food containers. The occurrence of bauxite is widespread in India. The more important deposits are in Bihar, Jammu, Madhya Pradesh, Tamil Nadu, Maharashtra, Mysore and Gujarat. The probable reserves in these areas are estimated at 250 million tonnes of which high grade reserves are estimated at 72.8 million tonnes. The present production is, however, quite small. In 1965, the production of bauxite in India was about 706,000 tonnes.

Non-metallic Minerals

Mica

Mica was used in the past in medicinal preparations and for decorative purposes. Today, it has its most important use in electrical industry, wireless telegraphy, radio equipment, aircraft engineering and motor transport. It is also used widely as stove fronts, lamp chimneys, fire-proof protective sheets, patent roofing materials and as a decorative material.

India is the largest mica-producing country in the world and produces more than three-fourths of the total world production. There is enormous wastage in the trimming and dressing of crude mica in India. About 70 to 80% of the crude mica become waste. It is exported to the U.S.A. where it is turned in to fine powder for various uses in electric insulation.

Although mica is widely distributed in India, two main areas produce the bulk of this mineral: (*i*) Bihar with an extensive belt—96 km. long and 22 km. broad—in the districts of Hazaribagh, Gaya, Monghyr and Manbhum, and (*ii*) Nellore district of Andhra Pradesh. The Bihar belt supplies more than 80% of the Indian ouput of mica. The deposits in Bihar are spread over an area of about 1,500 square miles. The quality of Bihar mica is also the finest in the world. In the Nellore district of Andhra Pradesh mica is raised in open quarries at Gudur, Kavali, Atmakur and Rajpur. Other areas which produce mica are Rajasthan (Ajmer and Jaipur), Tamil Nadu (Nilgiris) and Kerala. In 1965, the total production of crude mica in India was little more than 23,000 tonnes.

The consumption of mica in India is very small. It is produced mainly for export. The value of mica exported in 1965-66 came to Rs. 11.3 crores. The principal buyers are the U.S.A., the U.K., West Germany and France. Nearly half of the exports go to the U.S.A. Recently, Canada and Brazil have been competing with India in some of the markets for mica. Moreover, synthetic (artificial) mica is also being substituted to a certain extent for natural mica. Nevertheless if the cost of mica can be kept low, its demand will continue to rise. To make larger profits it is necessary that micanite factories and mica grinding mills should be started so that India may be able to export processed mica products instead of raw mica.

Gypsum

Gypsum is mainly used in the manufacture of fertilisers, cement and certain kinds of paper. It can also be used to produce sulphuric acid. The annual production is a little over 1 million tonnes. By far the most important producer of gypsum in India is Rajasthan which produces nearly 80% of the total output. The deposits occur mainly in Bikaner, Jodhpur and Jaisalmer areas. The States of the Punjab, Haryana, Kashmir, Gujarat (Kathiawar) and Tamil Nadu (Tiruchirapalli) also produce gypsum. Rajasthan contains the largest reserves 980 million tonnes.

Graphite

Graphite is used for manufacturing certain types of polishes and paints, as lubricant for some types of machinery and in lead pencils. Large deposits of graphite occur in India in the States of Kerala, Andhra Pradesh (Vishakhapatnam and Godavari districts), Orissa, Madhya Pradesh and Rajasthan (Ajmer and Marwar). The present production of graphite is, however, very small and comes to only 1,500 tonnes a year as against the demand for about 2,500 tonnes.

Limestone

Limestone has its most important use as a raw material in smelting iron ore. It is also used for manufacturing cement and mortar, and in agricultural operations. Limestone rocks and quarries occur in India in the States of Bihar (Singhbhum, Hazaribagh, Palamau and Sahahabad districts), Orissa (Koraput, Sambalpur and Sundargarh areas), Madhya Pradesh (Durg, Bilaspur, Jabalpur, Morena, Mandasor, Malhargarh, Sohawal), Andhra Pradesh (Kurnool, Guntur, Anantapur, East Godavari and Hyderabad districts) Rajasthan, Tamil Nadu, Mysore (Shimoga), Maharashtra and U.P. It is also found in the Punjab, Haryana and Assam in small quantities. The production of limestone in 1965 was 19.9 million tonnes.

Dolomite

Dolomite is used mainly in smelting iron ore. The production of dolomite takes place in the States of Bihar, Orissa, Madhya Pradesh, Tamil Nadu, Rajasthan and Assam. India produces about one million tonnes of dolomite a year.

Salt

Salt is a common article of consumption. It has also some industrial uses. In India, salt is mainly obtained from three sources: (*i*) from sea-water, (*ii*) from inland lakes, and (*iii*) from salt rocks. The output of rock salt is very small as compared to that produced from saline water. Rock salt is found only in Himachal Pradesh (Mandi). More than two-thirds of the total production of salt comes from sea-water on the coasts of Gujarat, Tamil Nadu and Maharashtra. Gujarat supplies about 40 p.c. of the total sea-water salt. The West Coast salt works include Rann of Kutch, Kathiawar and the coastal areas from Surat to Mangalore. Dharsana and Okha manufacture salt in large quantities. Udipi in Mysore also produces salt. The salt-producing districts of the eastern coast of India extend from Ganjam (Orissa) to Tuticorin (Tamil Nadu). Tamil Nadu is an important producer of salt and accounts for about 20% of the total production in India. Kerala and Andhra Pradesh are also important producers of salt. In the coastal districts of West Bengal, salt is produced from sea-water in small factories and cottage establishments. Another important source of salt is the inland lakes and sub-soil water of Rajasthan. Sambhar Lake in Rajasthan is the biggest and the oldest salt-lake in India. The Didwana field produces relatively small quantity. Rajasthan produces about 400,000 tonnes of salt. The production of salt in India in 1964 was about 4.7 million tonnes. The greater part of salt produced in India is used for household purposes. Only a small quantity (less than one-fifth of total output) is used for industrial purposes. With the present demand mainly for household use, the production of salt is more than sufficient to meet India's own requirements. Thus, there is a large export trade in salt. The quantity available for export has increased considerably since exports started in 1951. In 1965, India exported salt valued at Rs. 68 lakhs. India exports salt to Japan, Indonesia and Nepal.

Saltpetre

Saltpetre or nitre is in great demand for the manufacture of glass and gunpowder, as a manure, and for food preservation. In India, it is mainly used as a manure in tea gardens. The most important producers are Bihar and U.P. The greater part of the production is exported to the U.S.A., the U.K., Ceylon, and Mauritius.

Other Minerals

India produces large number of other minerals in various parts of the country like asbestos (used in making fire-proof materials), magnesite (used in aircraft industry in combination with aluminium and zinc, as a refractory material and a filler in paints and rubber industries), kyanite (used as a refractory material and in pottery, enamel and glassworks), steatite (Soapstone or talc, used in textile, rubber, paper and paint industries), apatite used as a fertilizer and in metallurgy), barytes (used mainly in paints, paper, cloth, glass and enamel), feldspar (used in ceramic and glass industries), garnet (used as a gem), diamond and quartz (or silica, used largely in pottery and as a refractory material), berryllium (used in the metallic springs and in X-ray tubes) and corundum (used as loose grain in optical grinding, on paper and cloth, and in the form of abrasive wheels).

Conclusion

India's position in respect of minerals will be properly appreciated if we group the

minerals on the basis of demand and supply. Thus, there is one category of minerals in which India has large exportable surplus to dominate the world markets e.g. iron and mica. There is a second category of minerals which are in surplus and are exported. In this group may be placed such minerals as manganese, magnesite, refractory minerals, steatite, silica, monazite, beryllium and corundum. There is a third category of minerals in which India may be regarded as self-sufficient. Some of these are coal, aluminium, chromite, marble, slate, sodium salts, limestone and dolomite, gypsum, nitrates, phosphates, vandium glass sand, borax, etc. Finally, there is the group of minerals in which India has to depend entirely or substantially on imports from outside. Lead, zinc, tin, mercury, tungsten, nickel, silver, sulphur, petroleum, copper, antimony, graphite, etc., belong to this group.

On the whole, India's position in regard to the production of non-ferrous (base) metals like copper, lead, zinc, tin, nickel and antimony is not satisfactory. In all these minerals it is dependent on foreign supplies. Its position with regard to the supply of sulphur is also unsatisfactory. The current consumption of sulphur does not exceed 180,000 tonnes a year. But with the increase in the requirements of chemicals, and fertilizers, the demand for sulphur, a basic mineral, is likely to go up very high. India does not produce sulphur and has to import about 75,000 tonnes every year. The sources of import are the U.S.A. and Italy. Similarly, India requires nickel for engineering and chemical industries but there is no production of nickel in this country at present. Normally about 1000 tonnes of nickel are imported by India, most of which comes from Canada. Nickel deposits are however known to occur in Manipur, Bihar and Kashmir. India consumes about 7000 tonnes of tin annually and the entire requirement is met by imports of tin from Malayasia, Singapore, Indonesia and Thailand. Similar is the case with zinc. India produces only a small quantity of zinc concentrates against her annual demand of about 85,000 tonnes. It has thus to depend heavily on foreign imports of zinc. For antimony too, we depend entirely on foreign imports.

Fortunately India has also a number of minerals in which it has large exportable surplus. These minerals—manganese, mica, chromite, refractories, etc.,—play a vital role in earning foreign exchange.

It may be noted however, that minerals are not inexhaustible resources; nor can they be replaced, once extracted. They cannot be produced to order, whatever the effort. India is fortunate that inspite of increasing exploitation of minerals, there are sufficient reserves of various minerals available in the country. There are also a number of fields which are yet to be explored and developed. Nevertheless, with the rapid industrialisation of the country the resources in some minerals are likely to be exhausted in the near future, unless new fields are discovered. It is the policy of the Government of India that the mineral wealth of the country should be conserved and utilised mainly for the development of her own industries.

Questions and Discussion Topics

1. *Explain what is meant by essential, strategic and scarce minerals. How is India equipped with each class of minerals ?*

2. *Does India have an iron ore situation that might help her to build one of the world's leading iron and steel industries ? How large are her reserves ?*

3. *Is India self-sufficient in all minerals ? What are the minerals in short supply ?*

4. *What are the principal minerals of India ? Which of these are exported ?*

5. *Name the coal fields of India. What other minerals are produced in those areas ?*

6. *On an outline map of India, locate and name all the commercially important ironore deposits.*

7. *In a sketch map of India show the coal fields of the country as well as the major industries which depend on coal for power.*

8. *India has large exportable surplus in certain minerals to dominate world markets. What are these minerals ?*

Chapter 10

Power and Energy Resources

Categories of Natural Sources of Power

One of the most valuable assets in any country is a natural source of energy from which electricity can be generated. The economic progress of the people in India is closely linked up with the production and utilization of electrical energy and steam power. This is simply because mechanical power is indispensable for running all modern machinery, transport and communication system. The natural sources of power in India can be divided into two broad categories: (*i*) Irreplaceable (those which, once utilized, are lost for good and cannot be replaced by human effort) e.g., coal, oil, nuclear minerals like thorium, uranium etc., and (*ii*) Replaceable (those which are inexhaustible because of constant supply in nature or can be replaced by human effort) e.g., solar radiation, wind, water and wood. The principal sources of power in India are wood fuel, oil, water and coal. Tidal water, wind and solar radiation have not been exploited so far to derive power on a commercial scale.

General Consideration about the Sources of Power

Electricity generated from water is known as 'hydro-electricity,' 'hydro-power' or ('hydel-power'). Power generated from coal and oil is known as 'thermal power'. The pattern of power development in India at present is as follows:

i) Mainly hydro-power in the States of Mysore, Kerala, the Punjab, Haryana, Orissa, Jammu and Kashmir.

ii) Mainly thermal power in the States of Bihar, West Bengal, Gujarat and Rajasthan.

iii) Partly thermal-power and partly hydro-power in the States of Maharashtra, Tamil Nadu, Andhra Pradesh, U.P., Assam and Madhya Pradesh.

The progress of electricity development and power and supply in India were very slow till 1925 when the aggregate installed capacity of power-plants was only 0.16 kw. By 1945, it had increased more than five times to 0.9m kw. The installed generating capacity at the beginning of the First Plan stood at 2.3 million kw. At the end of the First Plan period it was 3.42 million kw. During the Second Plan there was an increase of 64% in the generating capacity and it rose to 5.6. million kw. By the end of the Third Plan, the aggregate generating capacity was expected to be 12.5 million kw.

The per capita generation of electricity has thus increased from 18 kwh in 1951 to 28 kwh in 1956, 45 kwh in 1961 and about 100 kwh in 1965. Even with this impressive rate of development, India's position in the rate of power utilisation in the world is very low. Thus, as against an annual per capita generation of 100 kwh in India, the per capita generation in Norway is 7,740 kwh, in Canada 5,780 kwh, and in the U.K. 1910 kwh, while in Japan it is 815 kwh. It may be noted however, that development of electricity in India has been largely determined by the rate of industrial development in the country. The rapid growth of power generation in recent years gives enough evidence of the industrial development which can be expected in the years to come.

Relative Importance of Sources of Power

The relative importance of the sources of power in the generation of electricity is indicated in the following table:

Installed Capacity of Power Generation

(thousand kw)

	Coal	*Oil*	*Hydro*	*Total*
1947	7,57	98	5,08	13,63
1956	15,96	2,28	10,62	28,86
1962-63 ..	25,36	3,27	29,16	57,79
1963-64 ..	26,99	3,54	31,67	62,20
1964-65 ..	37,00	4,00	34,00	75,00

It is clear from the table that the importance of coal as a source of power was supreme till 1956. The development of power generation from oil also increased substantially till that year. In the subsequent years, power generation from oil has increased rather slowly, which is possibly due to the limited resources of oil in India and increasing difficulties of foreign exchange for importing oil. On the other-hand, hydro-electricity has taken the pride of place in recent years and is almost in the foremost position. But coal is still important as a source of power accounting for about 50 per cent of the installed capacity.

Wood Fuel

The extent of use of wood fuel as a source of power is not known because of lack of statistical data. To a large extent, this is used as a domestic fuel by the poorer sections of the people or in small industrial establishments. Of the total timber and wood produced in the country (about 16.14 million cubic metres a year), 75% consists of firewood and charcoal. Indian forests are generally confined to hilly tracts. Transport is difficult and expensive in those areas. But, planned utilization of wood as fuel can help the improvement of energy supply in certain areas. India has abundant sunshine and the utilisation of the solar energy for certain purposes like water heating, cooking, etc., is possible. However, it will take time to bring it into operation because of technical and economic factors.

Wind Power

Wind power can be utilized in the coastal regions of India but it cannot be depended upon to produce power with certainty at all times. Moreover, wind-driven machinery must be relatively large for a given power-capacity because of the low density of air. There is a considerable scope for wind-mill plants in parts of Gujarat and Rajasthan where the wind velocity is comparatively high.

Synthetic Fuel Oil

India has also large resources for the manufacture of synthetic fuel oils from sugarcane and oil seeds. Alcohol can be produced from molasses of which nearly 250,000 tons are now thrown away by sugar factories at present. In 1948, the Government of India prescribed that power alcohol (synthetic fuel oil) could be mixed with petroleum to the extent of 25%. The production of power alcohol in 1962 was about 225 million litres and came mainly from U.P., West Bengal, Mysore, Andhra Pradesh, Bihar and Gujarat. A new plant has been set up recently at Nasik in Maharashtra state which will produce 4.5 million litres of power alcohol a year. It is also possible to utilize vegetable oil contents for the preparation of fuel oil.

Nuclear Power

In view of the development of atomic energy, nuclear power is expected to play a greater role in meeting the power-requirements in future. The country has sufficient resources of uranium and thorium to develop this source of energy. A nuclear power station is under construction at Tarapur, near Bombay. It will consist of two reactors, each producing 190 mw of power.

Coal

Coal is the most important among all the power minerals produced in India, both in value and quantity. Coal has tremendous utility in running steamships and railways. Moreover, coke derived from coal is indispensable in the manufacture of iron and steel. India has large reserves of coal and so far as the production of coal is concerned it occupies the eighth place in the world. It has been estimated by the Government of India that the reserves of coal within a depth of 2,000 feet would be about 117,000 million tonnes. But there are certain serious handicaps in the matter of supply of coal. Indian coal is generally poor in quality as a fuel. Secondly, the coal fields are not evenly distributed in the country. More than 95 p.c. of the total output of coal comes from one big belt known as the 'Gondwana Coalfields' spread over West Bengal, Bihar, Orissa, and Madhya Pradesh. Transport of coal is difficult and costly because of its bulk as it is not available either near the coasts or in river basins so as to facilitate transport by steamships. Thirdly, workable coal reserves are estimated to be only 20,000 million tonnes and that of good quality coal is estimated to be only 5,000 million tonnes. In the opinion of experts, the reserves of good quality coal, if consumed at the present rate, will not last more than 100 years. Moreover, the reserves of coking coal are 1,500 million tonnes only.

The coalfields of India can be grouped into two belts: (1) Gondwana Coalfields extending from West Bengal through Bihar, Orissa and Madhya Pradesh; and (2) Tertiary Coalfields in Assam and Rajasthan. From the point of view of utilisation, Indian coal may be divided into five groups: (*i*) metallurgical coal (used in smelting iron) found in Jharia, Bokaro and Girdih coalfields of Bihar and Raniganj fields of West Bengal; (*ii*) high grade coal for steam-power generation found in Raniganj fields of West Bengal, Bokaro and Karanpura fields of Bihar, Talcher (Orissa) and Singareni (Andhra Pradesh); (*iii*) tertiary coal found in Assam and the Punjab; (iv) low-grade steam coal; and (*v*) lignite Coal found in Bikaner (Rajasthan) and Neyveli (Tamil Nadu).

Coal-mining started in India on a commercial scale some time in 1773 in the Raniganj area. It developed rapidly after railways expanded and covered different parts of the country. The production of coal has risen particularly during the period of the First and Second Five Year Plans. It would be interesting to note that the output of coal has risen from 34.9 million tonnes in 1951 to 69.5 million tonnes in 1965-66.

There are at present more than 800 coal mines in India. The earliest coalfields to be worked, Raniganj, covers an area of 1267 square km. It contributes about one-third of the coal production in India. The mines in this field are also the deepest. The Jharia coalfield is by far the most important coalfield both because of the abundance of coal found there, and its very high quality. Close to the Jharia field in the west lies the Bokaro field with an area of 467 square km. The North Karanpura field, also in Bihar, covers a wider area of more than 935 square km. The Girdih coalfield is relatively a small one but it yields some of the best quality coal to be found in India. In Madhya Pradesh there are three coalfields—one in Sohagpura in Rewa, the second in the Pench Valley in Satpura region, and the third in Umaria (near Katni). Recently a new coalfield has been located in the Kobra area. Maharashtra has now a number of coalfields in the Wardha valley. The most important coalfield of this valley is Singareni. Tertiary coalfields are worked in Assam (Nazira and Makum fields) and Rajasthan (Bikaner district). The output of coal from the Raniganj and Jharia coalfields is the maximum, annual production being between 16 and 18 million tonnes. There are reserves of lignite

in and around Neyveli in South Arcot, Tamil Nadu. Because of the paucity of coal deposits in Tamil Nadu, a multi-purpose lignite project is being developed at Neyveli. This area is expected to raise 5.5 million tonnes of lignite a year.

At present, the demand for coal is fast increasing between 1956 and 1962, the consumption of coal is said to have increased by more than 11 million tonnes. The demand for coking coal is a little more than 14 million tonnes whereas that of good quality steam coal is about 40 million tonnes. The Indian Railways consume about one-third of the good quality steam coal produced in the country.

The production of coal after meeting the home demands, does not leave much surplus for export. A small quantity is, however, exported to Ceylon, Burma, Singapore and Pakistan. In 1965-66, coal valued at Rs. 2.9 crores was exported.

Petroleum

Petroleum and its products are very important for the growth and expansion of industry and transport in India. Petrol, fuel oil, diesel oil, kerosene, and lubricants derived from petroleum are used in automobiles, aircrafts, locomotives, steamships, and in machinery manufacturing industries.

The first oil-field in India was discovered as early as 1867 at Mekum in Assam. But the production of oil started later in 1882 at Digboi in Lakhimpur district of Upper Assam. Digboi is now the oldest oil-field in India. It covers an area of about 20.72 square km. There are three main centres in this field—Digboi, Bappapur and Hansapung. In Surma Valley, there are some oil-fields, producing oil of a poor quality, at Badarpur, Masimpur and Patharia.

The indigenous production of crude oil in 1965 was about three million tonnes against the total requirements of about 12.1 million tonnes. The product comes from Digboi, Naharkatiya and Moran oil-fields in Assam and Ankleswar in Gujarat. Thus, about 25 per cent of the annual demand is now met out of the production of Indian oil-fields. Large quantities of oil are still required to be imported. In 1964-65 petroleum and petroleum products of the value of Rs. 69 crores were imported from Iran, Saudi Arabia, Bahrein Islands, Indonesia and the U.S.A. To save foreign exchange, India has recently set up a number of refineries.* The Fourth Plan envisages a production of 9.5 million tonnes of crude oil by 1970-71, out of total requirements of about 22 million tonnes.

Recent explorations and surveys have proved that India has vast oil-bearing areas extending over 800,000 square km in different parts of the country—Assam, Tripura, Manipur, West Bengal, the Punjab, Himachal Pradesh, Jammu & Kashmir, Rajasthan, Gujarat, Tamil Nadu coast, Andhra Pradesh coast, Kerala, and Andaman and Nicobar Islands. Oil has already been discovered in Jwalamukhi (Punjab) and Lunej in the Gulf of Cambay region. India's oil requirements are increasing so fast that to meet the country's needs it is urgently necessary to develop the oil-fields and undertake explorations for further development. It may be mentioned in this connection that India is said to have large reserves of natural gas which can serve the purpose of fuel. Natural gas has been found at Jwalamukhi in the Punjab; at Mahuvej, Ghosha and Vadesar in Gujarat; and at Naharkatiya and Daliajan fields in Assam.

Atomic Energy

Minerals like uranium, thorium and plutonium are the sources of atomic energy.

* Refineries have been set up at Trombay near Bombay by the Esso and Burmah Shell oil companies; at Visakhapatnam by the Caltex Oil Company; and at Barauni in Bihar, Nunmati in Assam and Cambay in Gujarat by the Indian Refineries Limited—a Government company.

In the near future, India is likely to use these minerals for power generation. The country has sufficient resources of thorium and uranium. The Government of India has started a factory at Alwaye (Kerala) to work monazite sands for thorium and uranium.

A mine is being developed at Jaduguda (Bihar) for the production of 1000 tonnes of uranium ore per day. Nuclear fuel processing plants are also being set up.

Water-Power

Coal, oil and nuclear fuels are exhaustible sources of power. Running water as a source of energy is inexhaustible. The initial capital investment for installing hydro-power plant is heavy. But the recurring cost of hydro-power generation is relatively low.

India has immense possibilities of developing water-power, and promises to be one of the leading countries of the world as regards hydel-power potential. The vast potentiality of water-power development in India is evident from the fact that the developed hydel-power forms less than 10% of the total power potential which is estimated to be 40 million kw. It is difficult to set up hydel-power plants in all areas because power supply must be continuous whereas rainfall is seasonal. Costly storage works are necessary in the mountainous and hilly regions where rainfall is heavy.

The first hydro-electric station in India was erected on the Cauvery river at Sivasamudram in Mysore in 1902. In the Western Ghats of Maharashtra, there are three very old power stations at Lonavla, Nila Mula and Andhra Valley. The Lonavla Works are situated on the Bhor Ghats where rain water is stored in three lakes (Lonavla, Walwan and Shirawata). Water is carried by canals and pipe-lines to Khapoli at the foot of the Bhor Ghats for power-generation. The Andhra Valley Power Works are situated at Bhivpuri near a dam across the Andhra river. The Nila Mula Works are situated in the southeast of Bombay on the Nila Mula river. It was developed in 1927. Western India has practically no coal; this deficiency is largely compensated by the water-power resources of the Western Ghats. Some of the more recent projects under construction in this area are Bhira, Koyna, Sahasrakunda and Vaitarna hydro-electric projects.

Hydro-electric power is highly developed in South India and used for industrial purposes as well as for irrigation by pumping. About a half of the total installed capacity of hydel-power in South India is in Tamil Nadu. There are three important power stations in Tamil Nadu: (*i*) Pykara, (*ii*) Mettur and (*iii*) Papanasam. The Pykara Works are situated on the Pykara river in the Nilgiri district. The Mettur Hydel Works are located below the Mettur Dam on the Cauvery river. The Mettur power grid is linked with the Pykara Works at Erode. The Papanasam hydel-power system is situated on the Tamraparni river in the Tirunelveli district.

The Sivasamudram power station in Mysore is on the Cauvery river, about 147 km from the Kolar Goldfields. In Kerala, there is one hydro-electric power station at Palivasal which generates about 22,500 kw. A number of other hydel-power projects are at various stages of construction in South India.

Andhra Pradesh does not depend on hydro-electricity as much as Tamil Nadu does. But she has a number of hydel-power schemes under construction like the Tungabhadra Project, Upper Sileru Project, Nagarjunasagar Project and Srisailam Project.

As in Tamil Nadu, hydro-electric installations in U.P. also supply power for irrigation and industrial purposes. There are seven hydro-power stations on the Ganga Canal in its course from Hardwar to Meerut. They are situated at Bahadurabad, Mohammadpur, Chitaura, Salwa, Bhola, Palra and Sumera.

In the Punjab and Haryana, hydel-power is generated from the waters of the Beas, the Uhl and the Sutlej. The Bhakra-Nangal Project on the Sutlej river has an installed capacity of 217,000 kw.

The Damodar Valley Project which serves West Bengal and Bihar has an installed hydro-power capacity of 146,000 kw on the four dams at Tilayia, Konar, Maithon and Panchet Hill. The Jaldhaka Hydro-electric Project in West Bengal is estimated to have an installed capacity of 27,000 kw. In Bihar, the Gandak and Kosi Projects are estimated to have 15,000 and 20,000 kw installed power-capacity. The Hirakud Project in Orissa is situated on the river, Mahanadi, and will have an installed capacity of 147,000 kw of hydel-power. Balimela hydel scheme will benefit both Orissa and Andhra Pradesh with an installed capacity of 180,000 kw of hydel-power.

A few important schemes have also been undertaken in Rajasthan and Madhya-Pradesh. These are: Kota Hydro-electric Project (Rajasthan), and Tawa Project and Purna Project (Madhya Pradesh). The Purna hydel project will also benefit Gujarat and Maharashtra.

Conclusion

India has a number of sources of mechanical energy. But the country has to depend primarily on coal and water-power, because other sources are either inadequate or yet to be developed. The distribution of coalfields and the hydel-power stations is most uneven in the country. Nor is their physical presence a matter of choice since men can do little to alter their location. There are areas which do not have coalfields or hydel stations. The development and utilisation of power resources in the country, therefore, have been carefully planned to ensure economical use and better distribution through inter-State collaboration.

Questions and Discussion Topics

1. *What are the principal sources of power in India ? Discuss their distribution and utilisation.*
2. *State the uses of coal and its by-products. Give the location of the coalfields in India and their relative importance.*
3. *What are the conditions required for the development of hydro-electric power ? To what extent has hydro-electric power been developed in India ?*
4. *Describe the present position of the petroleum resources in India.*
5. *Compare the prospects of coal and hydro-electricity as sources of power for the development of industries in India in future.*
6. *Name and locate the principal oil-producing areas of India. Does the future appear to be bright for oil industry in India ? Discuss.*
7. *Which is more sought after in India—coal or petroleum ? Why ?*

Chapter 11

Manufacturing Industries

India has made remarkable progress in the development of manufacturing industries in recent years, particularly during the period of the Five Year Plans. The industrial establishments may be divided into three broad groups: (*i*) capital goods industries, (*ii*) intermediate goods industries, and (*iii*) consumer goods industries. Capital goods industries produce machinery, machine tools and other equipment for producers. Consumer goods industries are those which are engaged in the manufacture of articles for direct consumption by the people, e.g., cloth, sugar, paper, match, etc. Intermediate goods industries produce things which are used in the manufacture of capital or consumer goods. Some intermediate goods industries are called 'Basic' industries as their products are essential for the development of other industries, e.g., iron and steel, heavy chemicals, etc.

Classification of Industries

Indian industries may also be classified on the basis of their size and scale of operation. Thus, we have (*i*) large-scale industries which are organised and operated on a large scale, (*ii*) medium-scale industries, and (*iii*) small-scale industries which are engaged in small-scale production and are generally scattered over different parts of the country. Cotton and rayon textiles, jute, iron and steel, cement, paper, etc., are industries organised on a large scale. Such industries as cotton handloom weaving, carpet making, silk, coir spinning and weaving, leather tanning, brass works, wood work, etc., are organised in small establishments in India.

Structure of Industries

From the point of view of planned development and government control, industries in India belong to two broad sectors, (*i*) public sector and (*ii*) private sector. Industries in the public sector are owned and managed or closely controlled by the Government. They are organised in one of the following ways: (*a*) as a Government department; (*b*) as a public corporation; (*c*) as a government company (wholly financed and controlled by the Government; and (*d*) mixed companies (which are jointly financed by the Government and private industrialists and on which the Government has substantial power of control). Industries in the private sector are owned and managed by private industrialists organised as joint stock companies or as proprietary concerns. Cotton, textile, jute, sugar, paper, chemicals, cement, automobiles, various engineering industries as well as the small-scale industrial units are mainly in the private sector.

The private sector and public sector industries are not in water-tight compartments. There are many industries like iron and steel, engineering goods and fertilisers in which some manufacturing establishments are owned by the Government while others are owned by private industrialists. The role of industrial units in the two sectors is supplementary to one another. The Government has kept a wide sphere for the development of private enterprises. In fact, in a developing economy like India's, there should be enough scope for the development of private as well as public enter-

prises even within the same industry, as it exists in iron and steel industry.

Location of Industries

The location of any industrial unit is determined by a variety of factors and their relative significance, e.g., availability of raw materials, power, labour, transport, markets and finance. Industries which use raw materials in their primary stage in large quantities are usually located near their sources. This is particularly so in cases where the raw materials lose their weight in the process of manufacture or cannot bear high transport costs, or cannot be transported because of their perishable nature. The availability of raw materials in the neighbourhood is responsible for the concentration of jute mills in West Bengal, sugar mills in U.P. and cotton mills in Maharashtra and Gujarat. Availability of coal as a source of power has influenced the location of various industries in West Bengal and Bihar. The industries which use very large quantities of coal are generally located near coal mines. Coal loses its weight in the manufacture of iron and steel. Hence steel mills are generally located near coal mines. Of course, iron-ore and coal are sometimes found in the same region as in Bihar. With the development of water-power, many industries have been located near the sources of water-power as in Tamil Nadu, Mysore and Maharashtra. Facilities for transport have also a great influence on the location pattern of industries. Availability of cheap water-transport has been one of the chief reasons for the location of jute mills along the Hooghly river basin. The development of railway in India connecting the port-towns with hinterland determined the location of many industries around Calcutta, Bombay and Madras. It may be noted in this connection that the location of any industrial unit is determined after a careful balancing of all relevant factors.

Industrial Regions

Although manufacturing industries are scattered all over the country, there are three particular regions in which they are concentrated. These are: (*i*) the Damodar-Hooghly Zone in the east, (*ii*) the Western Zone and (*iii*) the Southern Zone. Two other regions which have developed a large number of industries in recent times are: (*i*) the Northern plains and (*ii*) the central region.

The Damodar-Hooghly industrial zone covers the south-eastern part of Bihar and southern part of West Bengal. It includes such industrial centres as Calcutta, Howrah, Jamshedpur, Ranchi, Hazaribagh, Chittaranjan, Sindri, Rupnarainpur, Durgapur, etc. The chief source of power in this region is coal. Industries developed in this region include iron and steel, jute, cotton, fertilisers, chemicals, locomotives, automobiles, glass, silk, aluminium and paper. The Western industrial zone covers the States of Maharashtra and Gujarat. The more important industrial centres in this zone are Bombay, Baroda, Poona, Ahmedabad and Surat with cotton, woollen and rayon textile, chemical, glass, sugar and automobile industries. The Southern Zone covers parts of Tamil Nadu and Mysore, and includes the industrial centres of Tamil Nadu, Madurai, Coimbatore and Bangalore. The area is noted for cotton textile, silk, sugar, glass, chemical, iron and steel, aircraft and telephone industries. The Western and Southern Zones depend primarily on hydel-power for industrial purposes.

The northern region covers the Ganga and Yamuna river-valleys. Allahabad, Kanpur, Lucknow and Delhi are important industrial centres in this region. The principal industries developed are: cotton textiles, paper, glass, sugar, chemicals, leather, and wool. The Central region in Madhya Pradesh is noted for textiles, cement, paper,

heavy chemicals and iron and steel manufacturers in places like Gwalior, Jabalpur, Indore, Bhopal and Bhilai.

Imbalance in Industrialization

In spite of the rapid industrialization in India under the Five Year Plans, the region-wise growth of industries has been somewhat unbalanced. The Government of India has adopted a firm policy of securing a regional balance in industrial growth. Of course, geo-economic factors (raw materials, power supply, market, etc.) play an important role in determining the location of industries. But an attempt has been made in recent times to bring about a gradual dispersal of industries in areas which have been industrially backward. Preference has been given to the location of public sector projects in relatively backward areas whenever this could be done without prejudice to technical and economic considerations. Similarly, while granting licences for private sector projects, the claim of backward areas is kept in view as far as possible.

Types of Manufacturing Industries in India

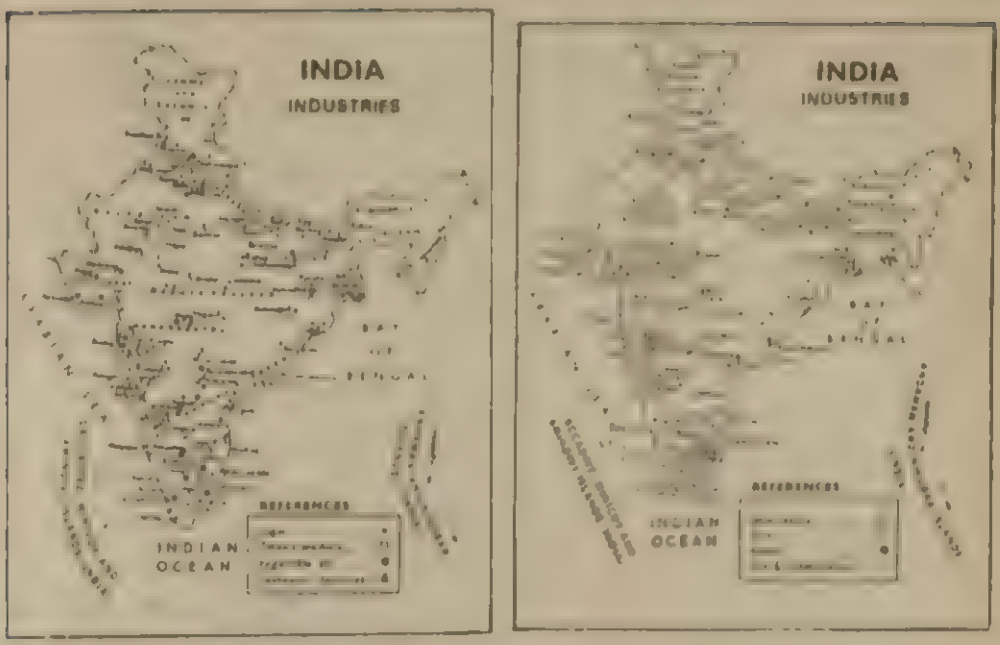
There are six broad categories of manufacturing industries in India. These are: food industries, textile industries, chemical and allied industries, electrical engineering industries, mechanical engineering industries and metallurgical industries. For long, due to the unsympathetic attitude of the British Government towards the industrialization of India, the growth of these industries was very slow. But after Independence in 1947, the National Government formulated an economic policy which led to the expansion of industries in all branches. Under the Five Year Plans, the growth and diversification of industries have been more rapid. Foundations have been laid of heavy electrical and heavy mechanical industries, heavy chemicals and other branches of basic industries, which were not developed at all in the earlier period. The output of many other industries has also increased substantially during this period as can be seen from the following figures.

Production of Manufacturing Industries

	1955-56	1960-61	1965-66
1. *Food and Beverage Industries*			
Sugar (million tonnes)	1.9	3.0	3.5
Tea (million kg.)	299	320	373
Coffee (000 tonnes)	29	51	62.1
2. *Textile Industries*			
Cotton cloth (million metres)	6260	6738	7440
Jute textiles (000 tonnes)	1071	1071	1301
Rayon yarn (000 tonnes)	13.5	43.8	76.6
3. *Chemical and Allied Industries*			
Cement (million tonnes)	4.7	8.0	10 8
Paper and paper-boards (000 tonnes)	190	350	559
4. *Mechanical Engineering Industries*			
Automobiles (nos. 000)	25.3	55	70.7
Sewing machines (nos. 000)	111	303	428
5. *Metallurgical Industries*			
Steel ingots (million tonnes)	1.7	3.5	6.5
Finished Steel (million tonnes)	1.3	2.4	4.5
Aluminium (000 tonnes)	7.4	18.3	60.5
6. *Electrical Engineering Industries*			
Electrical motors (000 h.p.)	272	728	1756

Small-scale and Village Industries

Although there has been considerable development of large-scale industries, the small-scale and village industries still occupy a prominent position in the Indian economy. It is estimated that more than 20 million people are engaged in these industries in India. From the point of view of size and location, they may be classified into three



(i) Based upon Survey of India Map with the permission of the Surveyor General of India
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(ii) The demarcation of the Gujarat-West Pakistan Boundary is in accordance with the Indo-Pakistan Western Boundary case, Tribunal Award is in progress (1969).

broad groups: (*a*) handicrafts, (*b*) small-scale industries and (*c*) village industries.

India has always been famous throughout the world for her handicrafts like wood work, brass work, ivory products, brocades, carpets, etc. The handicraft industries are mostly located in rural areas. The products are intended for local markets but often have a wider demand in the country. Of late the artistic products of the handicraft industries are also exported.

There are numerous problems of the handicraft industries relating to production, designing, marketing and finance. The All India Handicrafts Board was set up in 1952 by the Government of India to improve the production and marketing of handicrafts in India. It is running a number of special centres for training and research, revival of crafts, and the development of production and design. A large number of sales emporia have been established all over India for effective marketing.

The internal demand for products of handicrafts is very much limited on account of the low income level of the people. But it can be greatly extended through State help and emphasis on the use of handicrafts. The demand for export of these goods can also be expanded by suitable measures to meet the tastes of foreign buyers.

Broadly speaking, a small-scale industry is one which is organised and operated on a small scale. Small-scale industries are defined as industrial units with a capital investment in plant and machinery of not more than Rs. 750,000 irrespective of the number of persons employed. These industrial establishments are located in urban areas and produce goods for a wide market

inside and outside the country. Work is generally carried on with the help of simple tools and equipment. Some of them also use power-driven machinery and modern methods of production.

The production of small-scale industries in India include a large variety of goods: bicycles and parts, sewing machines, agricultural equipment and tools, locks, diesel engines, storage batteries, leather footwear, soap, drugs, sports goods, etc. The small-scale industries include many newly organised industries which are worked with power, e.g., manufacture of diesel engines, electric fans, etc., as well as some of the older industries such as handloom weaving, manufacture of locks, utensils, etc.

Financial assistance to small-scale industries is given by the Government, the State Financial Corporation and the State Bank of India. Loans are given by the Central Government to the State Governments for establishing industrial estates. The Central Government has also set up the All India Handloom Board and the Small-scale Industries Board to supplement the efforts of the State Governments in organising small-scale industries.

Of all the small-scale industries in India, the handloom industry has a special importance of its own. It employs five million people, more than the number employed in the large-scale industries, mines and plantations. In fact this industry is as widespread as agriculture and supplies more than 3146 million metres of cloth annually. It consumes about 250 million metres of yarn and has become an important market for the cotton spinning mills. The notable feature of the handloom industry is that it specialises in the production of a variety of cloths. The market for each variety is limited. Hence, cotton weaving mills find it uneconomical to produce such cloth. It is estimated that about 100 million metres of cloth are produced by the handloom industry using hand-spun yarn from 'charkha'.

Village industries are mainly engaged in the processing of local raw materials with simple techniques for local markets. A village industry has the characteristics of both handicrafts and small-scale industry. It is carried on wholly with the help of family members and not hired labour. It is located in the home of producers and is carried on as a subsidiary occupation with agriculture. Hence the name 'cottage industry'. The typical village industries are: village oil industry (*ghani*), hand pounding of rice (paddy husking), *gur* and *khandsari*, soap making, tanning, hand-made paper, woollen blankets, coir products and *khadi*.

The problems of small-scale and village industries are: (*i*) the lack of good quality raw materials, (*ii*) outmoded implements, (*iii*) unorganised marketing, (*iv*) the lack of adequate finance, (*v*) high cost of production, and (*vi*) the lack of technical skill. The Central Government has established the All India Khadi and Village Industries Commission, the All India Handloom Board, the Coir Board and the Central Silk Board to help the State Governments in organising the small-scale and village industries.

The development of small-scale industries is the responsibility of the State Governments. To secure productive efficiency, quality standards in production and economic use of raw materials and equipment, the Governments of various States have opened a number of 'industrial estates'. The idea is to promote the expansion of small-scale industries on up-to-date lines by providing ready factory accommodation with facilities of water, power and transport to a number of small industrial units located near one another.

Food Industries

Sugar Industry

India has been a large producer of sugar in the past, and even up to the latter part of

the 19th century she was an exporter of sugar to foreign markets. The increasing competition of Java sugar at the beginning of the 20th century led to the decline of the Indian sugar industry so much so that from the position of an exporter India soon became a large importer of sugar. The sugar industry revived again after 1932 under Government protection. The number of sugar mills increased from 32 in 1932 to 132 in 1939 and 138 in 1951. Production of sugar increased correspondingly from 160,000 tonnes in 1932 to 642,000 tonnes in 1939 and 1.1 million tonnes in 1951. There were about 150 sugar mills in 1964 which produced 3.2 million tonnes of sugar.

The industry has developed mainly in U.P. and Bihar which may be regarded as the sugar-belt of India. Out of the 150 mills in the country 72 are in U.P. and 30 in Bihar. The rest are located in Tamil Nadu (16 mills) and Maharashtra (15 mills). There are a few sugar mills in Andhra Pradesh, Haryana, the Punjab and West Bengal. The most important sugar manufacturing centres are Kanpur, Gorakhpur, Lucknow and Allahabad in U.P., Champaran, Muzaffarpur and Bhagalpur in Bihar, Coimbatore in Tamil Nadu and Belapur in Maharashtra.

The sugar industry has made remarkable progress in India during the last 30 years. The country is now not only self-sufficient in sugar but also in a position to export sugar. But there are certain limitations from which the high cost of production which results from a number of factors like seasonal character of production, high prices of cane, wastage in refining, low output due to the poor quality of cane, and high rent of land and taxation.

Production of sugar is carried on in India in three different ways: (*i*) by modern factories working with cane, (*ii*) by refineries working with 'gur' and (*iii*) by the indigenous vacuum-pan method of producing 'khandsari'. The modern mills working with cane produce white sugar, and they constitute the most important section of the industry. The 'gur' refining and 'khandsari' industries are inefficient and wasteful. But more than 80 per cent of the sugarcane is used for the manufacture of 'gur'.

Production of sugar yields many by-products like bagasse (rejected cane after crushing), press-mud and molasses. Bagasse can be used in the manufacture of paper and cardboard, press-mud in making carbon paper and shoe polish, and molasses in the manufacture of plastics, synthetic rubber, chemicals and power-alcohol. The by-products are not fully used in India at present.

However, the demand for sugar is rising in spite of high prices as a result of increasing population and incomes under the Five Year Plans of development. Indian sugar can be exported to the neighbouring countries of Afghanistan, Nepal, Burma, Ceylon and Pakistan. But the high price is a handicap in this respect. Increased production and a consequent reduction in price may help the industry to bring the product within the reach of a larger section of people to consume and also help it to export sugar. The progress already made by the sugar industry and the expansion of sugarcane production in recent years indicate a bright future for sugar-manufacture in India. The production of sugar was expected to be 3.5 million tonnes by 1965-66, sufficient for meeting the internal demand and leaving a surplus for export. The Fourth Plan proposes to have 4.5 million tonnes of sugar production by 1970-71 which will make it possible to export 750,000 tonnes of sugar.

Tea Industry

India is the largest tea-producing country in the world, next to China. There are two important regions producing tea: (*i*) north-east region including Assam, Tripura and the

hill districts of northern West Bengal; (*ii*) southern region covering Tamil Nadu, Kerala and Mysore. Small quantities of tea are also produced in Bihar, Maharashtra and the hill districts of U.P. and the Punjab. The tea-plantation industry provides direct employment to more than a million persons. Assam is the largest producer and contributes 50% of the total Indian production. The industry is highly developed in the districts of Darrang, Sibsagar, Lakhimpur, Cachar and in the Sadia Frontier Tract. West Bengal occupies the second position among the tea-producing States. Calcutta is the principal centre in India for the distribution and marketing of tea. The districts of Darjeeling and Jalpaiguri produce almost the entire output of West Bengal, which varies between 20 and 25% of the total Indian output. Tripura grows a small quantity. Purnea, Ranchi and Hazaribagh in Bihar, Garhwal and Almorah in U.P. and Kangra in Himachal Pradesh together account for 5% of the total production of tea. In southern India, the greater part of the output is obtained from Tamil Nadu and Kerala.

In 1965-66, the total production of tea in India was 373 million kg of which about 200 million kg were exported. Generally 65 to 70% of the total production of tea in India is exported. India is the foremost tea-exporting country in the world, supplying about 50% of the world's total exports. The U.K. is the most important market and accounts for more than two-thirds of our tea exports. Other important markets are the U.S.A., the U.S.S.R., Canada, Irish Republic (Eire), Egypt, Iran, Australia, the Netherlands, West Germany and Turkey. But Indian tea has to compete in the foreign markets with that of Ceylon, Indonesia, Pakistan, Japan and East African countries. On an average India supplies nearly 60% of the requirements of the U.K., 90% of the Irish Republic, 35% of the U.S.A., 45% of Canada, and substantial quantities to the U.A.R., Australia, and Iran. In 1965-66 India earned Rs. 115 crores from the export of tea.

In view of the importance of the tea industry to the country, the Government has been taking interest in its development from the early stage. The Tea Cess Committee set up in 1903 and the Tea Market Expansion Board since 1937 have been carrying on an intensive propaganda in favour of tea. The Central Tea Board was set up in 1953 with powers to take all measures for the development of the tea industry and tea trade. The consumption of tea within the country has increased very fast over all these years. But the volume of export has declined.

In order to meet the increasing demand for tea within the country and to promote its exports there is an urgent need for increasing the production of tea, but the future of the tea industry is closely bound with its cost of production. India has to produce good quality tea at reasonable cost in order to face successfully the growing competition in the foreign markets.

Coffee Industry

Production of coffee in India started more than 100 years ago in Mysore. The production varied from time to time as internal demand increased very slowly. From 1947 onwards, there has been a steady rise in its output. The production increased from 21,000 tonnes in 1950-51 to 62,100 tonnes in 1965-66. There are two varieties of coffee produced in India—Aribica and Robusta. The former accounts for 60% of the total production. The importance of the coffee industry lies in the fact that it provides employment to more than 200,000 persons. It is concentrated mainly in southern India. Mysore is the foremost producer and at times contributes 75 to 80% of the total output. The industry is particularly developed in the districts of Kadur, Shimoga, Hassan and Mysore. The Nilgiri district is

the most productive area in Tamil Nadu. It is carried on also in the south-western and western parts of the State. Coorg accounts for a little more than 1% of the total production of coffee in India. A small quantity is also produced in the Satara district of Maharashtra.

More than 80% of the annual production of coffee is consumed in India. It has already become a popular drink even in areas where tea had its monopoly till recently. Besides, great efforts are being made to promote exports of Indian coffee. At present it is exported to the U.K., France, Germany, the Netherlands, Belgium, Australia and Iraq. The U.K. is the largest buyer and takes about one-third of the exports. Mangalore is the chief exporting port. Exports also take place through Tellicherry, Calicut and Madras. In 1965-66, India earned Rs. 13 crores through exports of coffee to foreign markets. Both internal consumption and exports have consistently increased during the last ten years. The Indian Coffee Board which was established by the Government of India in 1957 controls the marketing and export of coffee. The Board is also responsible for publicity, research, and assistance to the coffee industry and its trade for development. The entire quantity of coffee produced in the country is required to be delivered to the Coffee Board under the present rules. A part of the supply is released for the internal market through public auctions and co-operative societies.

India is a party to the International Coffee Agreement of 1962 and has accepted the quota system of exports fixed under that agreement. She can export up to 21,000 tonnes of coffee to the countries which are parties to the agreement. She can export any quantity to other countries. The exports of Indian coffee are often affected by the competition of Brazilian coffee which dominates the world market. Still, there is a great scope for increasing the production and supply of coffee. There is an immense possibility of expanding the industry in Tamil Nadu and Mysore States. The Government of India is also making attempts to grow coffee in new areas like Araka Valley in Andhra Pradesh, in parts of West Bengal, Assam and Andaman Islands.

Questions and Discussion Topics

1. *What are the industrial regions of India ? State and explain the geographical factors responsible for the location of industries in these regions.*

2. *Give an account of the present position and prospects for the development of the small-scale industries in India.*

3. *Analyse the factors which favour the development of large-scale manufacturing industries in India.*

4. *State the main reasons for the present geographical distribution of the sugar industry in India. Is India self-sufficient in sugar ?*

5. *Give a geo-economic description of the tea industry in India with special reference to the location of the industry and export markets.*

6. *Give explanatory notes on the following:—*

   (*a*) *Cane sugar is essentially "a raw material localised industry".*

   (*b*) *Tea industry in Assam.*

7. *Explain to what extent the geographical conditions are favourable for the development of large-scale manufacturing industries in India.*

Chapter 12

Some Major Manufacturing Industries

Metallurgical and Engineering Industries

Iron and Steel Industry

The earliest attempt at the manufacture of iron and steel by modern methods was made in 1830 in South Arcot (Tamil Nadu) but it failed to produce any result. The Barakar Iron Works started a factory in 1874 on the Jharia Coalfield and it was acquired by the Bengal Iron and Steel Company in 1889. But even in this case, production was of the order of only 3,500 tonnes of pig iron in 1900. The real beginning of steel production was made in 1907 when the Tata Iron and Steel Company was established at Sakchi (now Jamshedpur) in Bihar. Two other manufacturing works which developed thereafter were the Indian Iron and Steel Company established in 1908 near Asansol in Bengal, and the Mysore State Iron Works (now Mysore Iron and Steel Company Limited) at Bhadravati (Mysore) in 1923.

The production of steel ingots and steel has considerably increased since 1950-51.

Production of Iron and Steel (in million tonnes)

Year	*Steel Ingots*	*Finished Steel*
1950-51	1.5	1.0
1955-56	1.7	1.3
1960-61	3.5	2.4
1963-64	5.9	4.3
1964-65	6.1	4.4
1965-66	6.5	4.5

India has vast resources of iron ore, coal, limestone and manganese which are essential for the development of iron and steel production. To produce one tonne of crude steel, a factory requires about two tonnes of iron ore, $1\frac{3}{4}$ tonnes of coal, $\frac{1}{2}$ tonne of limestone and $\frac{1}{2}$ tonne of other materials like dolomite, manganese, etc. The iron and steel industry has now become one of the biggest industries in India.

The location of iron and steel plant is determined by the availability of iron ore and coking coal nearby. Fortunately in India these are found in the same region within easy distance.

The Principal Centres of Iron and Steel Manufactures: At present there are six integrated steel manufacturing centres in India besides several hundred small rolling mills scattered all over the country. Of the six major steel plants, three are in the private sector and three in the public sector. The private sector plants are at Jamshedpur (Bihar), Burnpur (West Bengal) and Bhadravati (Mysore) owned respectively by the Tata Iron and Steel Company, the Indian Iron and Steel Company, and the Mysore Iron and Steel Company Limited. The steel plants in the public sector are located at Bhilai (Madhya Pradesh), Rourkela (Orissa) and Durgapur (West Bengal). Two more steel plants are being established—one at Bokaro (in Bihar) and the other at Neyveli (in Tamil Nadu). The public sector plants are owned and managed by the Hindustan Steel Limited, which is a Government company.

The Tata Steel Works at Jamshedpur has become the most important steel manufacturing centre in India during the last fifty

years. Iron ore is available to this centre from Gorumahisani, Salaipat, Badampahar and Noamundi mines in the Singhbhum district. Coal is brought from Jharia Coalfield which is at a distance of about 175 km. Manganese is available near Noamundi. Limestone and dolomite are also available from the Singhbhum district in the neighbourhood. The centre is connected with the adjoining areas by branch lines of the South Eastern Railway, and the cost of transportation of raw materials and finished products is not high. Necessary water supply is available from the river Subarnarekha and, when it dries up in summer, from the storage dam on the Kharkai river. The steel output was about 2 million tonnes in 1965-66.

The Indian Iron and Steel Company has steel works at Burnpur and Kulti. It is the second largest iron and steel manufacturing concern in India. It is supplied with coking coal from the Jharia and Ranigunj coalfields. Iron ore is available from the neighbouring fields of Pansia Buru and Gua in the Singhbhum district. Limestone, dolomite and manganese come from Gangpur area in Orissa and the adjoining parts of Madhya Pradesh. The Damodar river is the main source of water supply to the plants. The production capacity is 1.1 million tonnes of steel.

The Bhadravati Steel Works is situated on the river Bhadra in Western Mysore. It was first started in 1923 as a private concern but was later on taken over by the Mysore State Government. In the absence of coking coal nearby, the plant originally used charcoal for smelting iron. The adjoining forests in Shimoga and Kadur districts provided an abundant supply of wood for the purpose. Subsequently electric furnaces have been installed, and these are operated by hydel-power from Sivasamudram and Jog Hydro-electric Stations. There are large deposits of iron ore and other raw materials within easy distance of Bhadravati. Iron ore is obtained from Kemangundi and Shimoga fields. Limestone comes from Bhandigunda while manganese is available from Shimoga and Chitradurga. The Bhadravati Steel Works enjoys the advantage of having a local market for the products, being the only steel manufacturing centre at present in South India. The present annual output of its various products is: pig iron 85,000 tonnes, mild steel sections 30,000 tonnes, cast iron pipes 26,500 tonnes, ferrorelicon 20,000 tonnes, cast iron plate sleepers 15,000 tonnes, and steel castings 2,000 tonnes.

The Three New Centres : During the Second Five Year Plan (1956-61) three new steel plants were established by the Government at Bhilai, Rourkela and Durgapur. The Bhilai Steel plant is located in the district of Durg (in Madhya Pradesh) which is noted for its rich iron ore deposits. The main source of iron ore supply is the Dalli-Rajhara Range, about 20 miles south of Bhilai. Iron ore is also available in the adjoining districts of Durg, Chanda and Bastar. Coal is obtained partly from the nearby Korba fields and partly from Jharia. Limestone is available in abundance in Raipur and Bilaspur districts, and manganese in Balaghat area. Dolomite occurs in the Raipur and Bilaspur districts. The Bhilai steel centre has great importance as a source of supply of steel to the shipyard at Visakhapatnam and the industrial markets of Bombay and Madhya Pradesh. In 1964, it produced 1,270,000 tonnes of pig iron and 1,130,000 tonnes of steel ingots besides other steel manufactures like structurals and rails. The plant was set up with technical and financial assistance from the Soviet Union.

The steel plant at Rourkela (Orissa) has been developed with the assistance of a German steel manufacturing concern (Krupps-Demag). The Bonai iron ore field is only 80 km away from the plant. A new iron mine has been opened at Teldhi. Lime-

stone is available from Birmitrapur, and manganese from Jamda and Bonai districts within easy reach. However, coking coal has to be obtained from the Raniganj and Jharia fields a little further off. Coal from the Talcher mines (in Orissa) can be used in combination with Raniganj and Jharia coal. Water is supplied from the nearby Brahamani river. The Rourkela works produced 893,000 tonnes of pig iron and 9,13,000 tonnes of steel ingots in 1964.

The steel plant at Durgapur (West Bengal) was completed in 1962. During 1964, the plant produced 12,58,000 tonnes of pig iron and 9,13,000 tonnes of steel ingots. Iron ore is supplied to this plant from the Bolani region in Orissa. Coking coal is easily available from the Raniganj and Jharia coal-fields. Limestone, dolomite and manganese come from Gangpur area in Orissa and Madhya Pradesh. Water is supplied from the river Damodar. This plant has been put up with the assistance from the U.K.

Thus, five out of six steel centres are located in the mineral region covering West Bengal, South Bihar, Northern Orissa and Eastern Madhya Pradesh. A new steel plant is now proposed to be set up at Bokaro (in Bihar) within this mineral region with the help of the U.S.S.R. The initial capacity of the plant will be 1.5 million tonnes of ingot steel. Still another steel plant is likely to be set up at Neyveli (in Tamil Nadu) during the Fourth Five Year Plan.

Present Position : The rate of expansion of iron and steel production in India is an indication of their expanding demand. The primary difficulties of the iron and steel industries are shortage of capital, inadequate transport, uncertain supplies and variations in the quality of raw materials. Despite all these difficulties, high levels of production have been achieved. But the production is yet insufficient to meet the requirements of different kinds of iron and steel. Large imports have thus been made over all these years from the U.K., the U.S.A., and West Germany.

India has now reached a stage where it can export large quantities of pig iron. In 1965-66, India had 1.2 million tonnes of pig iron for sale. The chief markets for pig iron are Japan, the U.K. and the U.S.A. India also exports scrap iron and steel for remanufacture, mainly to the U.K. and Japan.

Even with her remarkable progress in steel manufacture in recent years, India still remains far behind the U.S.A., the U.S.S.R., the U.K. and West Germany. But the future outlook for the Indian iron and steel industry is bright. The vast natural resources of the country, potential markets in India and the neighbouring countries, and the rapid growth of skill in steel manufacturing ensure its future expansion. Moreover, of all the plans for increasing industrial output in India, the plan for steel is perhaps the most ambitious.

The Fourth Plan envisages the demand for finished steel and pig iron for sale by 1970-71 at about 10.5 million tonnes and 3 million tonnes, respectively. The corresponding requirements of steel ingots will be about 14 million tonnes. The production of steel ingots and steel in 1970 is aimed at 11.7 million tonnes and 8.8 million tonnes.

Engineering Industries

With the increased production of iron and steel in recent times, steps have been taken to build up the engineering industries to produce machinery and equipment of all kinds. Engineering industries can be divided into two broad groups: (*a*) mechanical engineering industries and (*b*) electrical engineering industries. Both these groups may again be sub-divided into light engineering and heavy engineering industries. The progress of all these industries began after independence of the country.

The products of light mechanical engineering industry include typewriters, sewing machines, bicycles, light machine tools, ball and roller bearings. The heavy mechanical products include industrial machinery for the manufacture of textiles, paper, chemicals, sugar and cement, industrial boilers, mobile cranes, heavy machine tools, railway locomotives, coaches and wagons, automobiles and tractors. The light electrical engineering industry produces such goods as electric bulbs, electric motors, radio receivers, air conditioners, domestic refrigerators, house-service meters, electric fans, cables and wires. Heavy electrical goods are electric turbines, transformers and generators, electric locomotives, heavy air-conditioners, etc.

The growth of engineering industries during the First and Second Five Year Plans has been possible with intense efforts of the Government, so that India has not only become self-sufficient in a number of light engineering goods but also has made considerable exports of such goods to the neighbouring countries. Some of the important centres of engineering industries are : Ranchi for heavy machinery, Durgapur for mining machinery, Bhopal for heavy electrical equipment, Bangalore and Ambernath (near Bombay) for machine tools, Chittaranjan for locomotives, Perambur (Madras) for railway coaches and wagons, Lucknow for precision instruments, Rupnarayanpur (West Bengal) for electric cables and Guindy (Madras) for surgical instruments.

Automobile Industry

The manufacture of automobiles was started in India after the Second World War. The industry has developed in two stages. In the first stage, all component parts were imported from abroad and assembled here. Manufacture of components started only in the second stage. At present more than 75% of the automobile parts are made in India. Thus, the automobile industry consists of manufacturing components and assembling them.

The location of automobile factories is determined by the possibility of manufacturing component parts or their easy availability in the neighbourhood, the presence of technical skills and the facilities for distributing the finished products by rail or roads. All these factors have made Calcutta, Bombay and Madras the principal automobile manufacturing centres. Jamshedpur has also become an important centre for automobiles (commercial vehicles).

In 1965-66, the total number of automobiles produced was 70,700--commercial vehicles 35,300 and cars, jeeps, etc., 35,400.

India has large resources of iron and the production of iron and steel is likely to be sufficient to meet the increasing requirements of the automobile industry. Rubber, glass, leather, textiles and chemical industries can supply the other raw materials for automobile manufacture. It is expected that 95% of the components will be made in India in the near future. India has already begun to export automobile ancillaries, and earned about Rs. 3 crores in 1966-67.

Locomotive Industry

Railway transport is an important aid to industry and trade. The railway system has great significance from the point of view of both economic development and defence of the country. Before independence Indian railways were entirely dependent on imported locomotives (railway engines) from the U.K., Canada, Germany and the U.S.A. After the Second World War, a large number of locomotives in use needed early replacement. Moreover, increased railway services required more locomotives.

As part of a plan to achieve self-sufficiency in locomotives, the Government of India set up a locomotive factory at Chittaranjan in West Bengal near the coal-mines and steel

centres of Bihar and West Bengal. It assembled the first locomotive in November, 1950. It was originally designed to produce 120 locomotives and 50 spare boilers a year. With gradual expansion it is now in a position to manufacture 200 standard type locomotives. In the year 1962-63, the factory produced 169 broad gauge steam locomotives and 14 broad gauge electric locomotives. The ultimate aim is to produce 300 steam locomotives and 72 electric locomotives per year.

Another locomotive manufacturing centre is Jamshedpur where the Tata Engineering and Locomotive Company produces metre gauge locomotives. At present, the Company produces about 70 metre gauge locomotives. India has now become almost self-sufficient in steam locomotives and may be able to export them. A factory is being set up at Varanasi to produce diesel locomotives, and it is expected to turn out 25 diesel locomotives per year.

Ship-building Industry

The Indian ship-building industry was well-known in the past. But it lost much of its importance in the 18th century with the discovery of steam engine and use of steel in place of timber in making ships. The necessary requirements for a modern ship-building industry are: (*a*) deep-water harbour and yards for construction and repairing, (*b*) availability of building materials, and (*c*) skilled labour. Steel and timber are important raw materials required for building ships.

The Scindia Steam Navigation Company opened a ship-building yard at Vishakhapatnam (Andhra Pradesh) in 1941. The development of this ship-yard in subsequent years was due to a number of factors. Vishakhapatnam has a deep-water harbour suitable for launching big ships. The tidal range is also satisfactory here. The harbour at Vishakhapatnam is situated on the eastern coast midway between Calcutta and Madras. This facilitates the transport of necessary raw materials by sea from the areas adjoining Calcutta and Madras. Iron and steel can be brought to the ship-yard from Jamshedpur. The coalfields of Bihar, Orissa and Madhya Pradesh are within its easy reach. Timber necessary for making decks, cabins, etc., are easily obtained from Chotanagpur. The local labour is cheap and can be trained for technical jobs without much difficulty.

The first ocean-going ship of 8,000 tonnes capacity was launched from Vishakhapatnam in 1948. In 1952 the Government of India took over the ship-yard and entrusted its management to the Hindustan Ship-yard Limited—a company which is now wholly owned by the Government. Between 1948 and 1963, the ship-yard has built 36 ships with an aggregate capacity of 1,68,200 tonnes. It can now build four ships of 5,000 to 15,000 tonnes capacity per year. The total ship-yard capacity at Vishakhapatnam is 20,000 gross tonnage. The expansion programme under the Third Five Year Plan has increased the capacity to 50,000 tonnes per year. A second ship-yard is proposed to be built at Cochin with an initial capacity of 60,000 tonnage of ships per year. Cochin is an excellent harbour and there are repairing yards in its backwaters.

The ship-building industry can be developed at Uluberia or Rajgunj near Calcutta. The sources of raw materials are within easy distance and there is a highly developed engineering industry at Calcutta. But ship-building yards cannot be developed conveniently at Bombay or Madras. Bombay is far away from coalfields and steel manufacturing centres. Madras does not have a natural harbour as the sea is shallow.

The Indian ship-building industry is still dependent upon imports of propelling engines and other auxiliary parts. There is a shortage of steel plates required in the construction

of ships and these have also to be imported. For all these reasons the cost of building ships in India is higher than that in the U.K., Germany and Japan.

Aircraft Industry

Apart from the requirements of military aircraft, India with its long distances has vast possibilities of civil aviation. The manufacture of aircraft requires huge capital investment and high technical skill. An aircraft factory was started at Bangalore in the year 1941. The factory has now been taken over by the Government of India and managed by a government company—the Hindustan Aircraft, Limited. The factory undertakes repair, overhaul and manufacture of aeroplanes for the Indian Air Force. Since 1952 it is also producing trainer aircrafts on a large scale for the Indian Air Force, Navy and flying clubs. The Hindustan Aircraft Factory has designed and developed a light four-seater aircraft (Krishak) and a light multipurpose aircraft (Pushpak). It is also producing supersonic jet-aircraft and Vampire jet-fighters. Recently the factory has undertaken the production of turbo-jet engines and helicopters in collaboration with British and French companies respectively. A small unit of the Hindustan Aircraft, Limited has been opened at Barrackpore near Calcutta to do overhauling work. The IAF Aircraft Manufacturing Depot at Kanpur has undertaken the production of a new type of aircraft, Avro-748.

The aircraft industry has a bright future as India has more than 40 air service routes. The development of civil aviation is bound to increase the coverage and frequency of air services in the country.

Textile Industries

Cotton Textile Industry

The products of the cotton textile industry consist of yarn and woven goods like grey and bleached piece-goods, coloured piece-goods, hosiery, mixed fabrics (mixed with silk and wool) and miscellaneous goods like shirting, carpets, etc. India is one of the leading cotton-manufacturing countries of the world. Cotton yarn and textile industry has four distinct types of manufacturing establishments : (*i*) mills producing yarns (spinning mills), (*ii*) mills producing both yarn and cloth (composite mills), (*iii*) power-loom factories manufacturing cloth and mill-made yarn, and (*iv*) handloom establishments producing cloth from both mill-made and hand-spun yarns. There are also some weaving mills which produce only cloth from mill-made yarns.

In 1965, there were more than 523 cotton mills in India besides a large number of units engaged in handloom weaving. The production of cotton yarn and textiles has increased regularly over the last 15 years.

Production of Cotton Textiles

Year	*Cotton Yarn* (million kg)	Cotton Cloth (million metres) *Mill Production*	*Handloom & Powerloom Production*
1950-51	534	3,401	814
1955-56	744	4,665	1,595
1960-61	801	4,649	2,089
1961-62	873	4,686	2,429
1964-65	968	4,675	3,069
1965-66	907	4,401	3,039

Cotton mills are scattered over the whole of India in about 80 towns and cities. But the number of mills are concentrated in five states, viz., Maharashtra, Gujarat, West Bengal, Tamil Nadu and U.P.

The following table shows the distribution of cotton mills in different States :—

Distribution of Cotton Mills in India

States (Cotton-Growing)	*No. of Mills*
Maharashtra	100
Gujarat	112
Tamil Nadu	139
Madhya Pradesh	20
Andhra Pradesh	15
Punjab	6
Pondicherry	3
Other States	
West Bengal	40
Mysore	21
Uttar Pradesh	29
Kerala	14
Rajasthan	11
Delhi	7
Orissa	4
Bihar	2
Total India :	523

The Principal Manufacturing Centres : As many as 395 cotton mills out of a total number of 523 (or 76 per cent) are situated in the cotton-growing States and there is a heavy concentration of mills in the cities of Bombay and Ahmedabad. The States of Maharashtra and Gujarat have 212 mills of which 63 are in Bombay and 72 are in Ahmedabad.

Bombay is the foremost cotton-manufacturing centre in India. The first cotton mill was started here in 1854. Most of the mills here are of large size. The localization of cotton mills in Bombay was originally due to a number of factors. The early development of railways around Bombay facilitated the availability of raw cotton and marketing of products. Bombay was already an important centre of cotton trade, and raw cotton used to be brought here for export purposes so that when the mills were started, they had a ready supply of raw cotton. Textile machineries could be easily imported from Europe through the port of Bombay. The humid climate of the coastal area is highly suitable for spinning cotton. Financial and banking facilities are easily available in Bombay which is a great commercial and financial centre. Cheap labour is provided by the neighbouring districts of Satara, Konkan and Sholapur. Of all these factors, the most important have been the financial and credit facilities, means of transport and the fact of Bombay being a port. It is thus said that Bombay has combined the textile specialisation of Manchester with the commercial and shipping characteristics of Liverpool. The mills in Bombay mostly specialise in the manufacture of textiles of finer count.

Ahmedabad in Gujarat is the second largest cotton-manufacturing city in India. The first mill was started here in 1859. The area had a glorious past in the art of spinning and weaving. Skilled weavers were easily available. Being situated in the heart of cotton-growing region, it had easy access to raw cotton. The mills in Ahmedabad are smaller in size than those in Bombay but they are specially noted for producing textiles of higher counts.

In the State of Maharashtra, Sholapur is the second largest textile centre followed by Poona, Yeotmal, Nagpur, Akola and Nasik. The textile centres in Gujarat, besides Ahmedabad, are Surat, Broach, Baroda, Kalol, Rajkot, and Bhavnagar.

While the number of cotton mills in Bombay and Ahmedabad have remained almost the same for sometime, there has been a rapid development of cotton mills in other parts of the country in recent years. Several reasons have contributed to this development. Firstly, the development of railways throughout the country has made it convenient for raw cotton to be carried to and cotton manufactures to be distributed from interior centres. Secondly, hydel-power development has relieved many parts of the country of the problem of power supply. Thirdly, labour costs have been found to be lower in new centres. Fourthly, cotton is a 'pure' raw material (i.e., it does not lose weight in the process of manufacture) and

the location of a manufacturing centre near the markets has been as profitable as location in the cotton-growing areas. Lastly, older industrial cities have become more costly for new factory sites due to lack of space and high rent.

The State of Tamil Nadu has a large number of cotton mills. Most of the mills are of small size and they concentrate mainly on spinning. The greater part of the yarn produced is supplied to the handloom industry. The important textile centres in Tamil Nadu are Coimbatore, Madurai, Salem, Tirunelveli, Ramanathapuram, Tuticorin and Madras. Pondicherry, in the same region, is also an important textile centre. Hydro-electric power is largely used in all these centres.

In West Bengal, the cotton mills are located all along the Hooghly river basin within a radius of 51 km from Calcutta. The area is served by a network of railways, and also by the river Hooghly. Jharia and Ranigunj coalfields are situated nearby and the port of Calcutta provides excellent facilities for the import of raw cotton and textile machinery. West Bengal is a great market for cotton manufactures. The moist climate of the region is also advantageous for cotton spinning. The mills are situated far from the cotton-growing lands. But the transport cost of raw cotton is largely compensated by the availability of coal in the neighbourhood and the large demand for cloth in the local market.

Uttar Pradesh is the next most important State as regards cotton manufactures with Kanpur as the chief centre. Other centres of textile manufacture are Agra, Aligarh, Etawah, Moradabad, Rampur, Modinagar, Saharanpur and Dehra Dun.

Export of Cotton Textiles : As regards cotton textiles, India is the second largest exporter next to Japan. The average share of cotton piecegoods in the total exports of our country has been nearly 15 per cent. More than two-thirds of the exports consist of medium varieties of cloth; nearly one-fifth consists of coarse varieties; and the remainder consists of fine and superfine varieties. Exports are made to the U.K., Indonesia, Sudan, Nigeria, Australia, Kenya, Ethiopia, Tanzania (Tanganiyka), Malaysia and Ceylon. Other important markets are Afghanistan, Burma, Rhodesia, Saudi Arabia, Iran, Iraq and New Zealand. The main competitors of Indian textiles in the world markets are the U.K., Japan, France and the U.S.A. These countries along with India account for about 80 per cent of the world trade in cotton piecegoods. Japan is the leading exporter followed by India, the U.S.A., the U.K. and France.

In 1963-64, India exported 520 million metres of cotton fabrics as against 670 million metres in 1961-62. The decline in export has been due to increasing competition from Japan and the U.K. and the development of textile industries in our former markets. In 1965-66, India earned Rs. 55.2 crores from export of cotton piecegoods.

If India is to compete successfully in the foreign markets, the productive efficiency of the industry will have to be raised. The Indian textiles will have to be competitive both in prices and quality. India has already got a foothold in the textile markets of Iran, Iraq, Saudi Arabia, Aden, Australia and New Zealand. These are essentially price-sensitive markets, that is, India can maintain these markets only if she can reduce the cost of production of cotton piecegoods. The Fourth Plan aims at stepping up production of cotton textiles from 7600 million metres in 1965-66 to 10,058 million metres by 1970-71. An export target of 665 million metres is also visualised.

Jute Mill Industry

The first jute mill was set up in India at Rishra near Calcutta in 1855. Now there are

as many as 112 mills. The most important products of the jute industry are gunny bags, hessian (or gunny cloth), cordage and carpets. Jute is also used for manufacturing tarpaulines, canvas, curtains and upholstery fabrics.

After cotton textile industry, jute manufacturing is the most important and well-organised industry in India. It employs about 300,000 workers. Jute goods are among the foremost export products of India. India possesses 53 per cent of the world's total capacity of jute manufacture, while Pakistan has only 10 per cent, West Germany 7.2 per cent, Great Britain 7 per cent, France 5.3 per cent and Italy 4 per cent. The jute mills in India, unlike those in Europe, are composite mills and undertake both spinning and weaving.

The Leadership of the Hoogly Basin : The industrial region around Calcutta has the undisputed leadership in jute manufactures in India. Out of the 112 jute mills in the country, 101 are located along the lower Hooghly basin within a radius of 64 km of Calcutta; there are 4 mills in Andhra Pradesh, 3 each in Bihar and U.P. and one in Madhya Pradesh. Several factors are responsible for the localisation of the jute mill industry in the Hooghly basin. The beginning of the industry in this area was largely due to the early settlement of British merchants in Calcutta. The Brahmaputra valley and the lower Ganga basin are the foremost jute-growing areas of the world. The location of jute mills in the Hooghly basin helps easy transportation of raw jute from the interior. Again, as 80 per cent of the Indian jute manufactures are meant for export, the products are easily transported through the port of Calcutta. The Raniganj Coalfield is only 192 km away, and the freight charges for bringing coal to Calcutta are not high. Humid climate so necessary for jute manufacture is also characteristic of this region. Calcutta has a regular flow of labour from Bihar, Orissa and U.P. Being a trading centre, the city provides banking, credit and marketing facilities. Moreover, the port of Calcutta helps the importation of machinery and equipment by the mills.

Types of Manufactures: India now produces a little more than one million tonnes of jute goods every year. The bulk of it is produced by the jute mills in the industrial area of Calcutta. After the partition of the country, the jute mills in India had to depend heavily on the raw jute supplied from Pakistan. Inadequacy of raw jute supply reduced the production of jute mills a great deal immediately after the partition. Majority of the mills had to seal off a part of their looms. However, India is now almost self-sufficient in jute. The mills also make use of mesta, a fibre similar to jute. Only a small quantity of jute is imported from Pakistan now.

The greater part of jute manufacture consists of gunny bags (sacking) and hessian (gunny cloth). In recent years, production of various other goods like carpets, upholstery fabrics, electric insulation, blankets, etc., has been increasing. An outstanding achievement in the Third Plan was the rapid expansion in the production of carpet backing cloth for which there has been a very large demand in recent years. The production of jute textiles in 1965-66 was 1.3 million tonnes as against 837,000 tonnes in 1950-51. The Fourth Plan envisages a production of 1.7 million tonnes in 1970-71, corresponding to 1.1 million tonnes of exports and 600,000 tonnes of internal consumption.

Exports of Jute: About 70 to 80 per cent of the Indian jute manufactures are exported, amounting to 20 per cent of the value of all exports from India. In 1963-64 the volume of export was 503,000 tonnes out of a total production of 1,292,000 tonnes of jute goods. India earned Rs. 183 crores from jute exports in 1965-66. The main markets for

sacking are Australia, Cuba, Indonesia, Burma, Thailand and the U.K. On the whole, the U.S.A. is the largest buyer of Indian jute manufactures and accounts for about 33 per cent of the value of jute goods exported from India. The U.S.A. buys 50 per cent of the hessian. The U.K. is the second largest buyer of hessian cloth but it takes only half that of the U.S.A. Argentina takes about 10 per cent of the total exports of manufactures which include hessian cloth, hessian bags, gunny bags, sacking cloth and sand bags. Australia imports a large quantity of sacking for wheat and wool. There is also a considerable demand for twills in the U.A.R., South-West Africa and South America.

The Problems of Jute Industry: Jute goods are produced in India mostly for the world markets. But exports have not shown any improvement in recent years. There has been a steady growth of jute manufactures in many foreign countries. On the other hand, there is very little increase in the consumption of jute goods. The U.A.R., Iraq, Burma, Thailand and the Philippines have set up jute mills of their own. Of late, Pakistan is also rapidly developing her jute industry and competing with Indian exports in the world markets. The use of jute goods has been displaced in many countries by other means. Mechanical grain elevators and other appliances for the bulk handling of grain have taken the place of gunny bags in Canada, Argentina and Australia. In many other countries jute bags have been substituted by bags made of paper, cotton, sisal hemp and other fibres. In the U.S.A., which is the most important market for jute sacking, the use of paper bags and mechanical bulk-handling methods are continually increasing after the Second World War. Similarly in the U.K., France and West Germany, there is a growing demand for paper sacks in place of jute bags, and bulk-handling methods are coming into use for all types of packing. It is now estimated that about 90 per cent of the grain handling at the world ports is done by mechanical means. On the other hand, the U.S.A., Sweden, South Africa and Australia have been using cloth and paper bags to an increasing extent. New Zealand has introduced a new vegetable fibre for packing wool, while Argentina and the U.S.S.R. are using linseed fibre for packaging.

Besides inadequate export-demands, the Indian jute industry is suffering from certain other disadvantages. The mills cannot be worked to full capacity partly because of lack of demand and partly because of high cost of raw jute. The machinery and equipment have not been replaced for a long time. Many of those are obsolete and keep the cost of production high. To help the jute mills in modernising their machinery, the Government of India has adopted a liberal import licensing policy in respect of jute mill machinery. The National Industrial Development Corporation is also helping the industry with loans for that purpose.

In spite of the difficulties from which the jute industry is suffering, it has got a bright future. It is true that mechanical bulk-handling is a quick and convenient labour-saving process of handling grain. But it involves heavy initial costs and cannot be easily adopted in the less developed countries. It is also doubtful whether substitutes of jute will permanently stay in use. If the price of jute goods can be kept within reasonable limits, there is no real danger of jute being replaced by anything else. Jute products are comparatively cheaper; the gunny bags and sacking have a resale value; they can be used several times and become still more economical in the long run; they can stand rough handling and bad weather and can be repaired quickly.

The main problem before the industry is that of finding new markets and new uses of

its products. Thus, besides producing hessian and sacking, the industry has developed several new lines of manufacture in recent years like those of heat and electric insulation, car upholstery, water-proof covers, carpets, curtains and mixed fabrics blended with wool and cotton. In this way the industry is trying to meet the changing conditions of demand in the consuming countries. With increased agricultural production and greater demand for packing material, it is expected that home demand for jute manufactures will also increase. This will enable the industry to operate to full capacity. The cost of production will thus be reduced and competitive prices established in the market.

Woollen Textile Industry

Woollen mills were first established at Dhariwal and Kanpur. The location of these mills was determined mainly by the availability of cheap labour and water supply. In 1964, there were 46 woollen mills distributed as follows :

State	*Spinning Mills*	*Spinning and Weaving Mills*	*Total*
The Punjab and Haryana	..	26	26
Maharashtra and Gujarat	2	7	9
U.P.	..	4	4
Mysore	..	3	3
Madhya Pradesh	..	2	2
Kashmir	..	1	1
West Bengal ..	..	1	1
	2	44	46

The more important centres of woollen manufacture are Amritsar and Dhariwal in the Punjab, Srinagar in Kashmir, Bombay in Maharashtra, Bangalore in Mysore, Kanpur, Agra, and Mirzapur in U.P., Jaipur in Rajasthan, Gwalior in Madhya Pradesh and Jamnagar in Gujarat.

The production capacity for woollen manufactures in India is as follows : woollen and worsted yarn 30.5 million metres; woollen cloth 43.9 million metres; and wool tops 4.5 million kg. The actual production however does not exceed 12.7 million kg of woollen and worsted yarn and 13.2 million metres of cloth. The present gap between capacity and production is due to the shortage of good quality raw wool and uncertain market conditions.

Nearly 50 per cent of the woollen manufactures of India consists of blankets and another 29 per cent consists of woollen cloth. Carpets account for 12 per cent of the total production. The production in 1965-66 has been estimated at 23.6 million kg of woollen and worsted yarn, 32 million metres of woollen cloth and 14.1 million kg of wool tops.

India has developed an export trade in raw wool as well as woollen goods. In 1964-65 it exported raw wool worth Rs. 7 crores and Rs. one crore worth of other woollen goods. Carpets, rugs, piece-goods and shawls are exported to the U.K., the U.S.A., Canada and Australia.

The Silk Industry

The sericulture or silk industry was once a highly developed industry in India. Indian silk was not only in great demand within the country but also occupied an important place in world trade. During the latter part of the 19th century and early 20th century the silk industry declined rapidly as a result of competition from the silk manufactures of Italy and Japan. Attempts are being made in recent years to revive the industry again.

India is a large producer of raw silk. Four different varieties of silk are produced in different parts of the country—mulberry silk, 'tasar' silk, 'eri' and 'muga'. There are three important areas producing raw silk: (*i*) Southern Mysore and the adjoining Coimbatore district of Tamil Nadu, (*ii*) Murshidabad, Malda and Birbhum districts of West Bengal; (*iii*) Jammu and Kashmir with

the neighbouring districts of the Punjab and Himachal Pradesh. Tasar silk is produced in parts of Bihar, Orissa and Madhya Pradesh. 'Eri' and 'muga' are produced largely in Assam. Kashmir and Mysore are the most important producers of mulberry silk. Of the production of raw silk in India, about 75% is mulberry silk. The production of mulberry and non-mulberry silk was estimated at 2108 tonnes in 1965.

Silk-manufacturing Centres: The Indian silk industry consists of two sections : (*a*) Production of cocoons from silk-worms, and (*b*) reeling of silk-yarns and weaving of silk fabrics. The first operation is essentially a subsidiary occupation in villages, the second is carried on partly in mills and partly on handlooms. Sericulture, as a village industry, provides employment to more than 2.8 million people. The handloom weavers consume 90% of the raw silk produced in the country. The potential demand for raw silk is about 2.2 million kg. There are 90 silk factories in India, but only a few mills use power looms for silk manufacture. The principal silk-weaving centres are Murshidabad, Bankura, Bishnupur, Hooghly and Malda in West Bengal; Varanasi, Mirzapur and Shahjahanpur in Uttar Pradesh; Belgaum in Mysore State; Salem, Thanjavur and Tiruchirapalli in Tamil Nadu; Srinagar in Kashmir; Amritsar and Jullundur in the Punjab; and Nagpur, Sholapur and Poona in Maharashtra. Mysore is by far the most important silk-producing area and accounts for more than two-fifths of the total output of silk manufactures in India. The production of silk fabrics was 29.7 million square metres in 1965.

Indian silk has a considerable demand in foreign markets, particularly in Ceylon, Malaysia, Hongkong and East Africa. Of late, America and Western Europe have also become important buyers of Indian silk. India exported 2.5 million metres of silk fabrics in 1965.

Problems of Silk Industry: The problems of the sericulture industry are the high cost and the inferior quality of raw silk. The Central Silk Board, set up by the Government of India in 1949, is taking measures for the improvement in the quality of silk. A research centre has been established at Berhampore (West Bengal) to explore the possibilities of improving the methods of rearing silk-worms and reeling silk yarns. The other centres for research are Mysore (Mysore State) Ranchi (Bihar) and Srinagar (Kashmir).

Another problem is the increasing competition from chemical fibres like rayon, nylon, terrylene, etc. Only by reducing cost and improving quality can the silk industry be expected to maintain the demand for silk fabrics in the regular markets. Natural silk continues to enjoy its position as a luxury product for the well-to-do and aristocratic people. On the other hand, silk manufactures may have a considerable demand if they are designed properly and offered at competitive prices.

Chemical and Allied Industries

Paper Industry

The production of machine-made paper in India dates back to 1870 when a paper factory was established at Bally near Calcutta. During the Second World War, the number of paper mills increased to 15 and production of paper and paper-boards reached 1,03,884 tonnes by 1944. The industry has made very rapid progress since 1950. The production of paper and paper-boards was 116,000 tonnes in 1950-51. By 1955-56 it had gone up to 1,90,000 tonnes and by 1965-66 to 559,000 tonnes.

The chief requirements of the paper industry are basic raw materials (soft wood, wood pulp, grass, cotton waste, etc.), chemicals, soft water and power supply.

Location of paper mills is, therefore, largely determined by the availability of raw materials, power supply and nearness to market. In the earlier stages, paper mills in India developed mainly around Calcutta along the Hooghly river basin. Later on, the industry was developed in many parts of India.

However, West Bengal continues to be the most important producer of paper in the country. The mills in this region are fairly big in size and account for nearly 25% of the total output of paper in India. The centres are Naihati, Titaghur, Kankinara, Alambazar, Triveni and Raniganj. There are at present 28 paper mills in India of which six are in West Bengal. Both sabai grass and bamboo are used as raw materials by the mills in West Bengal. Sabai grass is obtained from Madhya Pradesh, and bamboo from the Sundarban area (in West Bengal), Assam, Bihar, and Orissa. The mills also use paper, cotton waste and rags collected from the city of Calcutta.

Next to West Bengal, Maharashtra is the most important state in the manufacture of paper. There are six mills in this region situated at Bombay, Khopoli and Ballarpur. These mills mostly use rags, waste paper and pulp as raw materials. The States of Andhra Pradesh, Mysore and Haryana have three paper mills each. In Andhra Pradesh, the centres of paper manufacture are Sirpur, Rajahmundry and Kaghaza-nagar. In Mysore, paper mills are situated at Bhadravati, Dandeli and Nanjangud. Of the three paper mills in Haryana, one is in Jagadhri (Ambala district) and two in Faridabad.

In Madhya Pradesh there are two paper mills, one at Bhopal and the other at Nepa-nagar which produces newsprint. Other paper-manufacturing centres in India are Lucknow and Saharanpur in U.P., Dalmia-nagar in Bihar, Barajadi in Gujarat, Brajaraj-nagar in Orissa, and Punalur in Kerala.

The types of paper manufactured in India are white printing, unbleached printing, writing paper, packing paper, coloured printing, badami paper, blotting and manila paper, and cardboard.

Although the paper industry has made a rapid progress in recent years, the output of paper is still inadequate for the requirements of the country. In the year 1964-65, it was necessary to import paper and paper-boards worth Rs. 13 crores. The production of newsprint is only 25,000 tonnes, whereas its demand is about 70,000 tonnes a year. With the spread of literacy and education in the country, the demand for all kinds of paper including newsprint is fast increasing.

India has abundant raw materials for the manufacture of paper. At present sabai grass and bamboo are the principal raw materials used for making paper. Wood pulp constitutes only 10% of the total quantity of raw materials used. Coniferous (softwood) trees like pine, spruce and fir grow in abundance in the Himalayan forests. But they cannot be easily exploited for lack of transport facilities. However, it may be possible to use pinewood of the Kashmir State for the manufacture of paper-pulp. 'Bagasse' is also an important raw material for the paper industry. It is not used now by the paper mills except to a limited extent in Bihar. The annual production of bagasse is estimated at 3.7 million tonnes. There is also a possibility of increasing the use of waste paper and rags as raw materials. The utilisation of waste paper is said to be only 8% in India as against 30% in other countries. Experiments have shown that newsprint can be manufactured in India from Indian spruce and mulberry. Indian spruce grows in the hills of the Punjab, Haryana, U.P. and Kashmir.

Bamboo pulp accounts for 70% of the raw materials used by paper mills in India. Bamboo grows extensively in Assam, Tamil Nadu,

Maharashtra and West Bengal. There are abundant sabai grass forests as well.

The development of the paper industry also requires adequate supplies of chemicals like caustic soda, soda ash, salt cake, bleaching powder and dyes. Some of these are still required to be imported from abroad.

The consumption of paper in India is still very low as compared to that in the Western countries. It is estimated that per capita consumption of paper in India is only 0.9 kg per year whereas it is as much as 90 kg in the European countries and 180 kg in the U.S.A. But the consumption of paper in India is increasing very rapidly. The production at the end of 1970-71 has been estimated at 1.1 million tonnes of paper and paper-boards and 165,000 tonnes of newsprint. A very substantial part of the increased output will be based on bagasse.

Chemical Industry

The chemical industry had a modest beginning during the First World War of 1914-18. It received further impetus during the Second World War when foreign supplies of chemicals were practically stopped. The industry has made remarkable progress under the Five Year Plans. There are more than 250 chemical factories now employing about 35,000 workers in different parts of the country.

The chemical industry supplies chemicals to a large number of other industries like textiles, paper, leather, soap, glass, paints, rubbers, fertilisers, etc. In fact production of soap, leather, glass, paints, medicines, bleaching powder, etc., would be impossible without chemicals.

The chemical industry can be divided into three broad sections according to the nature of products, viz., heavy chemicals, organic chemicals and electro-chemicals.

Heavy chemicals refer to those chemicals which are produced on a large scale, usually at a low cost, and which serve as raw materials or processing agents in the manufacture of other products. Compounds of sulphur, hydrochloric acid, caustic soda, soda ash, bleaching powder, etc., are examples of heavy chemicals. They are used in the production of textiles, leather, paper, etc. Chemical fertilisers which belong to the category of heavy chemical products have been playing an important role in the development of agriculture in recent times.

Heavy chemicals are produced in Bombay, Calcutta, Kanpur, Delhi, Amritsar, Madras and Bangalore, but the production is not sufficient to meet the requirements of the country. There are 44 factories located in West Bengal, Maharashtra, Bihar and Gujarat which produce sulphuric acid. Its production in 1965-66 was a little more than one million tonnes. The production for 1970-71 is estimated at 2.4 million tonnes. Caustic soda is mainly produced in West Bengal (at Rishra), Tamil Nadu (at Mettur), Gujarat (at Mithapur and Ahmedabad), Bihar (at Dehri-on-sone) and Delhi. Recently, new caustic soda plants have been set up at Porbandar (Gujarat) and Tuticorin (Tamil Nadu). The production of caustic soda in 1965-66 was 218,000 tonnes. India produced 218,000 tonnes of soda ash in 1965-66. The Fourth Plan proposes to increase the production of caustic soda and soda ash to 500,000 and 600,000 tonnes respectively, by 1970-71.

Production of chemical fertilisers first started at Belagula (Mysore) in 1942. A second factory was started in 1946 at Alwaye (Kerala). Other centres of production which have developed in recent years are Sindri (Bihar), Nangal (Haryana), Neyveli (Tamil Nadu), Rourkela (Orissa) and Trombay (Maharashtra). It is expected that a number of other centres will also develop within a few years. These are: Hanumangarh (Rajasthan), Vishakhapatnam and Kottagudem (Andhra Pradesh), Tuticorin

(Tamil Nadu) Baroda (Gujarat) and Mangalore (Mysore). The fertiliser plant at Sindri is the most important of all centres of production. In spite of the rapid growth of the fertiliser industry, supply is still inadequate to meet the increasing demand. The consumption of fertilisers per 0.4 hectare of arable land is only 0.9 kg in India as compared to 85 kg in Japan and 181 kg in the Netherlands. The Fourth Plan proposes to increase the production of chemical fertilisers. The targets for nitrogenous fertilisers in 1970-71 are 2.4 million tonnes of capacity and 2 million tonnes of production.

Organic chemicals are mainly obtained from coal tar which is a by-product of coal gas. Benzole, anthracene, creosote and other chemicals derived from the distillation of coal tar are used for manufacturing dyes, explosives, perfumes, plastics, disinfectants, medicines, photographic chemicals, synthetic rubber and paints. Organic chemicals are produced in Calcutta, Bombay, Jamshedpur, Jharia, Hirapur and Kulti. The Government of India has set up two D.D.T. factories at Delhi and Alwaye (Kerala) and a penicillin factory at Pimpri near Poona.

The electro-chemical industry is of comparatively recent origin in India. The more important products of this industry are calcium carbide and magnesium. The cost of electrical energy forms the major part of the cost of production in this country. Thus, its growth is largely dependent upon the availability of cheap power. The largest production centre of calcium carbide is at Birlapur near Calcutta. The development of the electro-chemical industry has been restricted in India due to the high cost of electrical energy. With the greater availability of cheap hydel-power, it is likely to prosper in course of time.

Cement Industry

Manufacture of cement first started in Madras in 1904. But the real beginning was made in 1912-13 when three companies were started at Porbandar (Gujarat), Katni (Madhya Pradesh) and Sawai-Madhopur (Rajasthan). Since then, the cement industry has made a rapid progress in the country and in 1964 there were as many as 36 cement factories.

Cement is a specially prepared material which is used as a binder in stone and brick structures and in making concrete. Next to steel, cement is the most essential constructional material. The demand for cement is increasing very fast in India because of the construction of river-valley projects, new ports, townships, roads and bridges, airfields, factories and public buildings. India has the natural advantage of having large deposits of all the essential raw materials required for producing cement. It has abundant resources of limestone of excellent quality, suitable clay as well as gypsum. About 1.6 tonnes of limestone and clay and 0.035 tonnes of gypsum are required to make one tonne of cement.

Centres of Production: The production of cement in India increased from 2.7 million tonnes in 1950-51 to 12.3 million tonnes in 1965-66. The centres of cement production are: Dalmianagar, Japla, Chaibasa, Sindri, Ranchi, Kalyanpur and Sone Valley in Bihar; Jabalpur, Gwalior and Katni in Madhya Pradesh; Coimbatore, Tiruchirapalli, Krishna and Tirunelveli in Tamil Nadu; Lakheri and Sawai-Madhopur in Rajasthan; Porbandar (Okhamanda) and Sevalia in Gujarat; Bhupendranagar and Dadri in the Punjab; Rajganagpur in Orissa; Bangalore in Mysore; Kottayam in Kerala; Vijayawada and Hyderabad in Andhra Pradesh; and Allahabad in U.P. Besides the 36 existing cement factories, nine more factories are being set up, two each in Maharashtra and Tamil Nadu, and one each in Mysore, Andhra Pradesh, Pondicherry, Assam and Kashmir. Although cement factories are widely distributed in India, there is concentration in

areas where limestone and fuel (coal) are abundantly available. Rajasthan, Madhya Pradesh, Bihar and Orissa are important producers of limestone and gypsum. Coalfields are also well-distributed in or near these States. However, all the producing centres do not have equal advantages regarding the availability of raw materials and fuel. In U.P., cement manufacture has developed because of the demand for cement. Non-availability of limestone of suitable grade has been responsible for the low production of cement in certain States.

India has become nearly self-sufficient in cement. But demand is rising very fast because of new construction programmes. Moreover, as the sources of raw materials are neither well distributed nor located in convenient places, the cost of transport tends to be heavy. In future, it may be necessary to use low-grade limestone to produce cement in different parts of the country. A new type of cement—Pozzolana—is being manufactured at Bhakra Dam (Punjab) from shale which is available there. The Fourth Plan envisages expansion of the capacity of cement production in India from 12 million tonnes in 1965-66 to 23 million tonnes in 1970-71.

India has developed a small export trade in cement in recent years. Cement is exported to Iraq, Ceylon and Indonesia.

Glass and Ceramic Industries

Glass manufacture has been known in India from ancient times. A modern glass factory was first started in Bombay in 1908. The glass industry developed rapidly during the First World War (1914-18). Its subsequent development has been through protective customs duties.

The products of the glass industry include sheet glass, bangles, and other blown and pressed glasswares like lampwares, bottles, phials, flasks, beads, beakers, tubes, plate-glass, tablewares, etc. The raw materials used in glass manufacture are sand (or silica), borax, soda ash, salt cake, dolomite, limestone, saltpetre, sulphur, manganese dioxide and colouring materials. Sand (silica) of different qualities is found in various parts of the country. There are abundant resources of good quality dolomite, limestone and saltpetre. But borax, sulphur, manganese dioxide and colouring materials have to be imported. Soda ash is partly imported and partly produced within the country.

In 1964, there were about 125 modern glass factories and 90 small establishments scattered all over the country. The modern factory industry produces sheet and plate glass, glass cakes for bangles, beads, bottles, phials, lampware, tableware and surgical and laboratory equipment. The cottage industry consisting of small glass factories produces bangles, and beads and simple glasswares. The production of glasswares has increased considerably since 1951. The production figures in 1964 were 9.6 million square feet of sheet glass, 4,400 metric tonnes of laboratory glassware, 53.5 million pieces of glass shells and 1,98,000 tonnes of other glasswares.

Uttar Pradesh, West Bengal and Maharashtra are the foremost States in the manufacture of glass and glassware. About 25% of the total production of glass in India comes from U.P., particularly Western U.P. In West Bengal, there are 30 factories as compared to 24 in U.P., but the factories in Bengal are smaller. In Maharashtra, there are 18 glass factories, in Madras 9 and in Bihar 8. Madhya Pradesh, the Punjab, Delhi and Mysore also have a number of glass factories. The cottage industry consisting of small units of glass manufacture is scattered all over the country. But the more important areas are Firozabad district of U.P. and Belgaum district of Mysore. India exports glass and glassware to Ceylon, Burma, Malaysia, Saudi Arabia, Iran, Indonesia, Indo-China, Afghanistan, Bahrein Island and Aden. But

she is also required to import glass. In 1964-65, the value of imported glass was Rs. 2 crores while the value of exports amounted to Rs. 6 lakhs. Besides expansion of production in all types of glasswares, the Third Five Year Plan also provided for the manufacture of optical and ophthalmic glass which were not produced so far in India. The centre of ophthalmic glass production is Durgapur in West Bengal. The glass factories have a total productive capacity of over 400,000 tonnes though the actual production is about 300,000 tonnes a year.

The ceramic industry is of comparatively recent growth in India. There are about 50 ceramic factories now producing white wares, sanitary wares, glazed tiles and high-tension insulators. The important centres of ceramic production are Calcutta, Bombay, Madras, Bangalore, Delhi and Baroda.

Conclusion

The manufacturing industries of India have been making rapid progress for more than ten years now and the production of large-scale industries practically has doubled. But the process of growth is far from complete. It would not be wrong to say that India has only entered the first stage of industrialisation and has prepared the base on which a sound industrial structure can be erected in the years to come. Problems in this regard are many and intricate. Development of capital goods industries, iron and steel, mechanical engineering, electrical engineering, heavy chemicals, etc., require huge investment in plant and machinery which have still to be imported from abroad. But the problem of foreign exchange does not permit costly machinery to be imported adequately. Skilled technicians are needed to set up and run these industries. It will take some time for us to be trained in large numbers to undertake technical jobs in all capital goods industries. Foreign technical assistance has to be secured in the meanwhile.

Certain consumer goods industries like cotton, jute and sugar have been facing the problem of raw material shortage. Seasonal factors often keep down the domestic production of raw cotton, raw jute and sugarcane. Farmers have a tendency to reduce the hectarage under these crops whenever prices decline as a result of good harvest. India does not produce adequate quantities of long-staple cotton for which there is a high demand. But imports cannot be made in large quantities on account of foreign exchange difficulties.

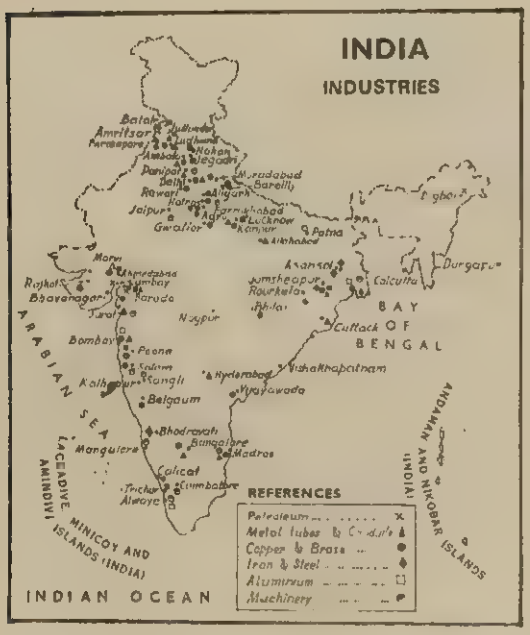
Another problem which has become serious in many industries is that of low productivity and high costs. If productivity falls, the cost of production goes up which either reduces profit or puts a heavier burden on consumers in the form of higher prices. To secure the advantages of efficient and economical production the mills should be equipped with up-to-date machinery and introduce methods of quality-control. With the prevailing high costs of production, these industries are constantly facing a problem of marketing their products particularly abroad. The cotton and jute manufacturers of India will not be able to compete with foreign products unless there is some cost advantage in their own production. This can be achieved by the use of modern machinery and the resulting increase in productivity. For these reasons, the renewal and replacement of productive equipment is essential.

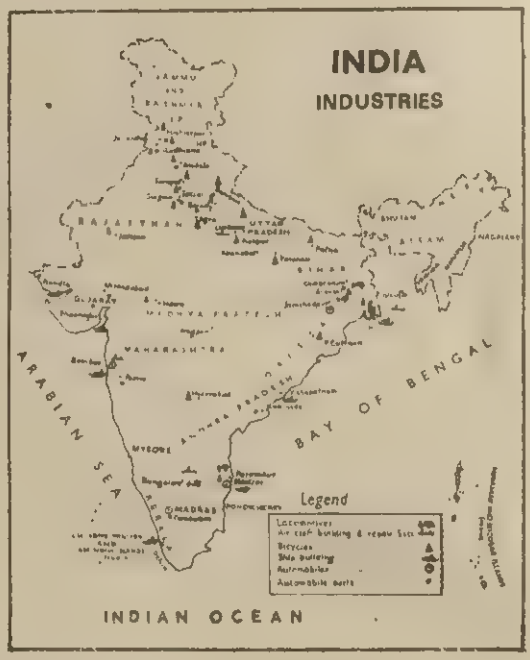
Industrial production has not increased according to expectations in all the cases and there are considerable shortfalls in some cases. The expansion of Sindri Fertiliser Factory and new fertiliser plants at Varanasi, Nangal, Neyveli and Rourkela were not completed in time and the increase in production was delayed mainly because of foreign exchange difficulties. The construction of the heavy electrical plant at Bhopal

as well as the heavy machinery project was also delayed. Moreover the actual cost of construction of many industrial projects was more than what was estimated in the development plans.

However, targets of capacity and production in many cases were approximately fulfilled. In some cases, for example, power-driven pumps, diesel engines, electric motors, cables, electric fans, radio receivers, etc., the targets were exceeded. The output of many industries was substantially increased, e.g., bicycles, sewing machines, telephones, and basic chemicals like caustic soda, soda ash and sulphuric acid.

On the whole, India has made a good beginning for a sound industrial structure under the Five Year Plans.





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Questions and Discussion Topics

1. *Give an account of the iron and steel industry in India, indicating the sources of raw materials and geographical reasons for the location of the steel centres.*

2. *Why are cotton mills localised in Ahmedabad and Bombay regions ? How will you explain the location of cotton mills in other parts of India ?*

3. *What are the factors responsible for the location of the jute industry on the Hooghly basin in and around Calcutta ? Briefly discuss the position of the jute industry as regards production and exports.*

4. *Where are the cement factories located in India and why ? What are the raw materials required for the cement industry ? Which of these have influenced the location of the cement industry ?*

5. *Name the raw materials used for the manufacture of paper. Describe the present position of the paper industry in India.*

6. *What are the conditions required for the development of a ship-yard ? What are the advantages possessed by Vishakhapatnam for the development of a ship-yard ? What are the other centres suitable for the development of the ship-building industry ?*

7. *Mention the sites where new factories are being set up in India for the manufacture of iron and steel, and account for their locations.*

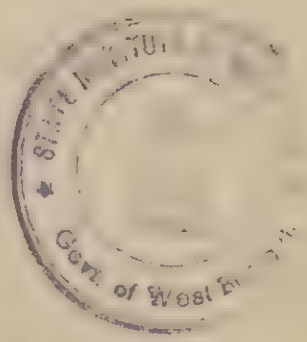
8. *What are the essential raw materials for the iron and steel industry and where are these found in India ? What do you know of the expansion schemes in this industry under the Five Year Plans ?*

9. *Account for the absence of:*

   a) Iron and Steel Industry in Kashmir,

   b) Ship-building at Bombay; and

   c) Jute mills in Rajasthan.



Chapter 13

The Transport System in India

Importance

Means of transport are needed in every country for the movement of goods and passengers. When goods are produced they have to be distributed for consumption and use. Raw materials and fuel must be brought to factory sites. Agricultural crops must be carried to the cities and towns. Manufactured goods have to be made available to the people in the country. Thus transportation plays a vital role in production and distribution. It helps a country to utilise its economic resources and products to the best possible advantage. It creates place utilities and prevents wide fluctuation in the prices of goods. The expansion of transport facilities is therefore most essential for the rapid development of an economy. Adequate means of transport are also essential for defence, particularly in a vast country like India.

Modes of Transport

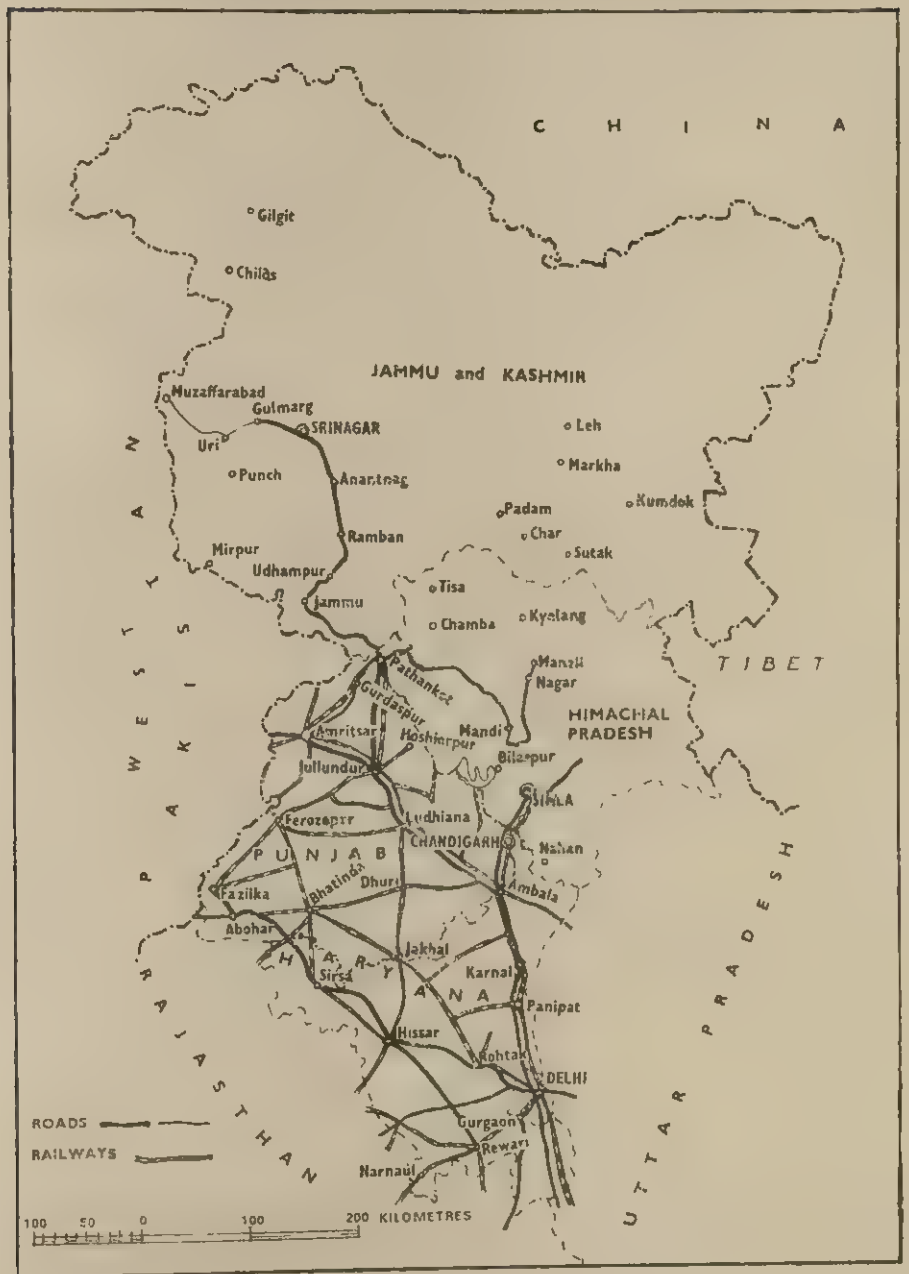
The transport system in India can be broadly divided into four categories: Rail Transport, Road Transport, Water Transport, and Air Transport. The importance of the means of transport is judged by the carrying capacity, speed, safety, dependability and the cost involved. Water transport is the cheapest of all forms of transport particularly for carrying bulky goods. But it is slow and not always safe and dependable. Rivers and canals may not be navigable all the year round because of floods or drought. On the other hand, air transport is the speediest, but it is the costliest of all. Besides, it is not convenient for carrying bulky goods. Road transport is economical as well as relatively speedy. It is highly suitable for short distances. Railway transport is preferable when goods have to be carried over a long distance. The cost of transport by rail is also reasonably low as its carrying capacity is high.

The transport systems in India have acquired great significance with the growth of industry and trade over the last fifty years or so. From the point of view of their commercial importance, rail and road transport are the most widely used in India. Waterways are relatively less important, so is air transport.

Rail Transport

In India, the railway route pattern has been very much influenced by political, economic and geographical factors. During the British regime, administrative considerations had largely determined the direction of railway lines. The railway development has been most intensive in and around the industrial regions which have grown in the hinterland of the port towns of Calcutta, Bombay and Madras. The conditions for railway operation are favourable in the Gangetic plains with a high density of population. The northern and western mountain ranges of Central India are low. Railways can bypass big ranges and cross the low ones by means of tunnels. The desert conditions in Rajasthan with low population density have made this area unsuitable for railway development. The

JAMMU and KASHMIR, HIMACHAL PRADESH, PUNJAB, HARYANA and DELHI



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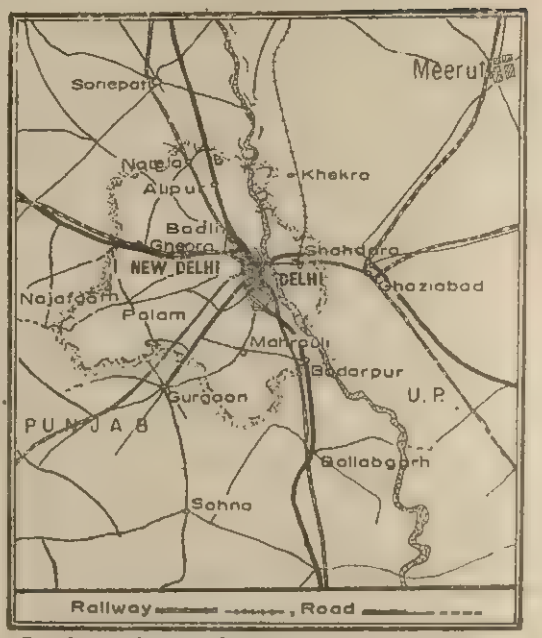
mountainous land of Kashmir is also inconvenient for railway operation. The swift-flowing rivers of Assam present great difficulties in the construction of bridges. Generally speaking, the railway routes have developed mostly in areas which are more productive and offer the least physical resistance.

The first railway line—32 km long—was opened in India in 1853. Today, the Indian Railway System has a total route length of 59,100 km. It is the second largest single railway network in the world, and employs more than one million persons.

Coal, cement, iron and other ores, limestone, mineral oils and foodgrains are the most important commodities which form the bulk of the railway traffic, and constitute about 70 per cent of the total traffic.

The railway system operates on three gauges—Broad Gauge (5′ 6″ wide), Metre Gauge (3′ 3⅜″ wide) and Narrow Gauge (2′ 6″ wide). Of the total route length, broad gauge accounts for 49 per cent, metre gauge 44 per cent and narrow gauge 7 per cent. For administrative convenience and efficiency of operation, the Indian railways have been divided into nine zonal railways, viz., Northern Railway, Eastern Railway, North-Eastern Railway, North-East Frontier Railway, South-Eastern Railway, Central Railway, Western Railway, Southern Railway and South-Central Railway.

Northern Railway: The total route length of the Northern Railway is 10,364 km (broad gauge 6,807 km; metre gauge 3,297 km; and narrow gauge 260 km). This railway serves the Punjab, Haryana, Delhi, Northern and Western Rajasthan, and U.P. up to Mughal Sarai. The Northern Railway headquarters is at Delhi. The main lines are from Amritsar to Mughal Sarai (1,171 km), Delhi to Mughal Sarai (780 km), Saharanpur to Delhi and Kalka to New Delhi.



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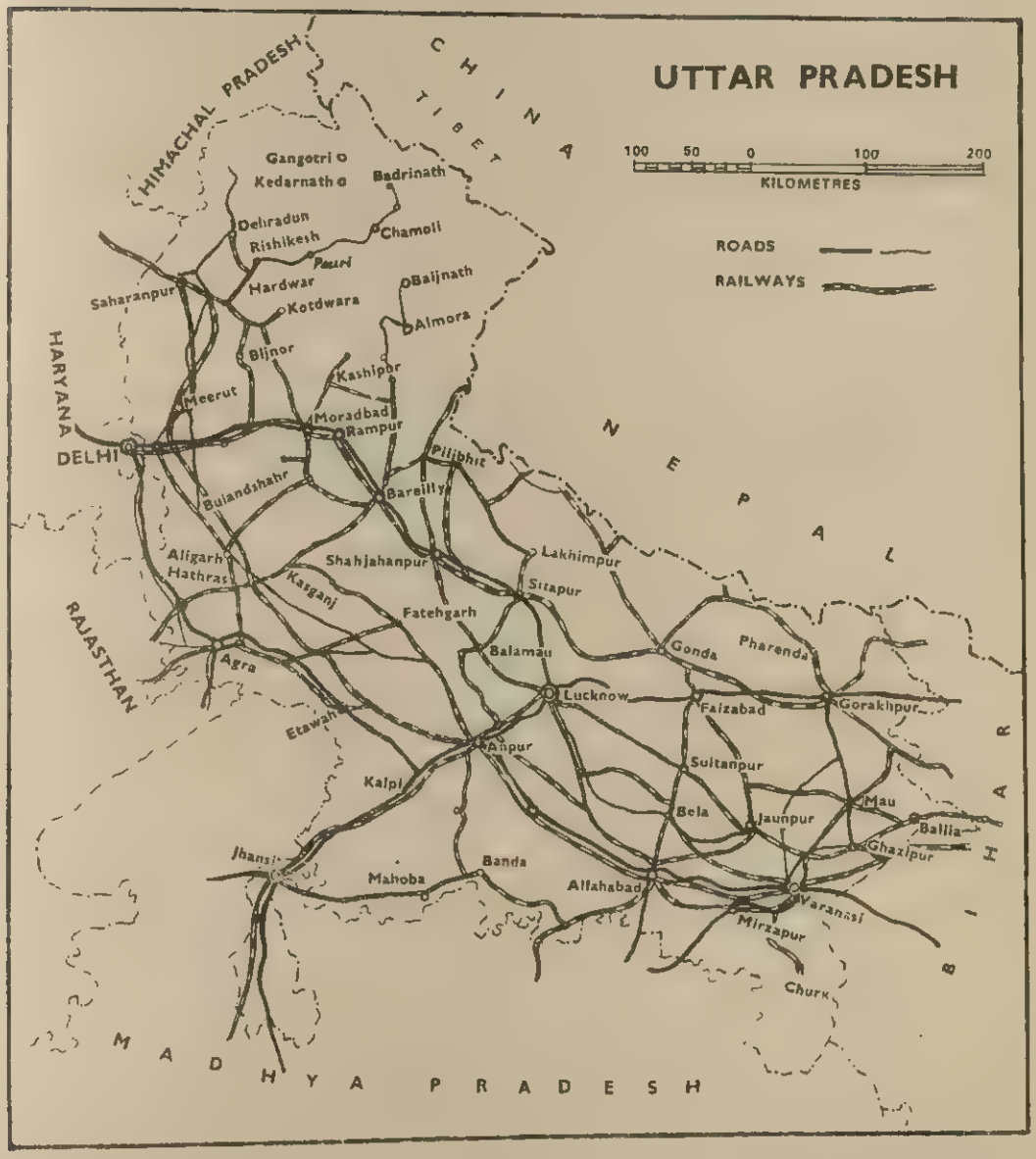
Eastern Railway: The Eastern Railway with 3,990 km of broad gauge and 28 km of narrow gauge lines serves the Eastern Gangetic plains between Mughal Sarai and Calcutta, covering parts of U.P., Bihar and West Bengal. The headquarters of this railway is at Calcutta. The main line is from Howrah to Mughal Sarai (757 km). The Eastern Railway handles the largest volume of goods traffic. Almost half the freight movement consists of coal followed by iron ore, manganese, jute and mica. The large volume of traffic on this railway is due to the fact that it covers the entire Hooghly-Damodar-basin industrial region.

North-Eastern Railway: This Railway has 4,915 km of metre gauge lines and 52 km of broad gauge lines. It has its headquarters at Gorakhpur and serves the northern parts of U.P. and Bihar. The important lines are Agra—Kanpur—Lucknow to Katihar *via* Chhapra and Muzaffarpur with link lines connecting Katihar with Siliguri, and branch lines between Lucknow and Bareilly, Bhatni and Allahabad, Chhapra and Varanasi.



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North-East Frontier Railway: This Railway with headquarters at Pandu (Assam) has 2,752 km of metre gauge, 178 km of broad gauge and 84 km of narrow gauge lines. The railway routes in this zone connect Muniharighat (Bihar) with Amingaon (Assam) *via* Katihar, Siliguri, Alipur Duar; Pandu with Gauhati and Tinsukia; and Ledo-Dibrugarh and Katihar-Jogbani by branch lines.

South-Eastern Railway: This Railway with its headquarters at Calcutta operates 4,634 km of broad gauge and 1,405 km of narrow gauge lines. It serves South-West Bengal, Orissa and part of Madhya Pradesh, and has two main lines, one connecting Howrah, Tatanagar and Nagpur with feeder lines between Tatanagar and the adjoining areas, and the second connecting Howrah and Waltair (Andhra Pradesh) *via* Balasore, Cuttack, Berhampore and Vizianagaram.

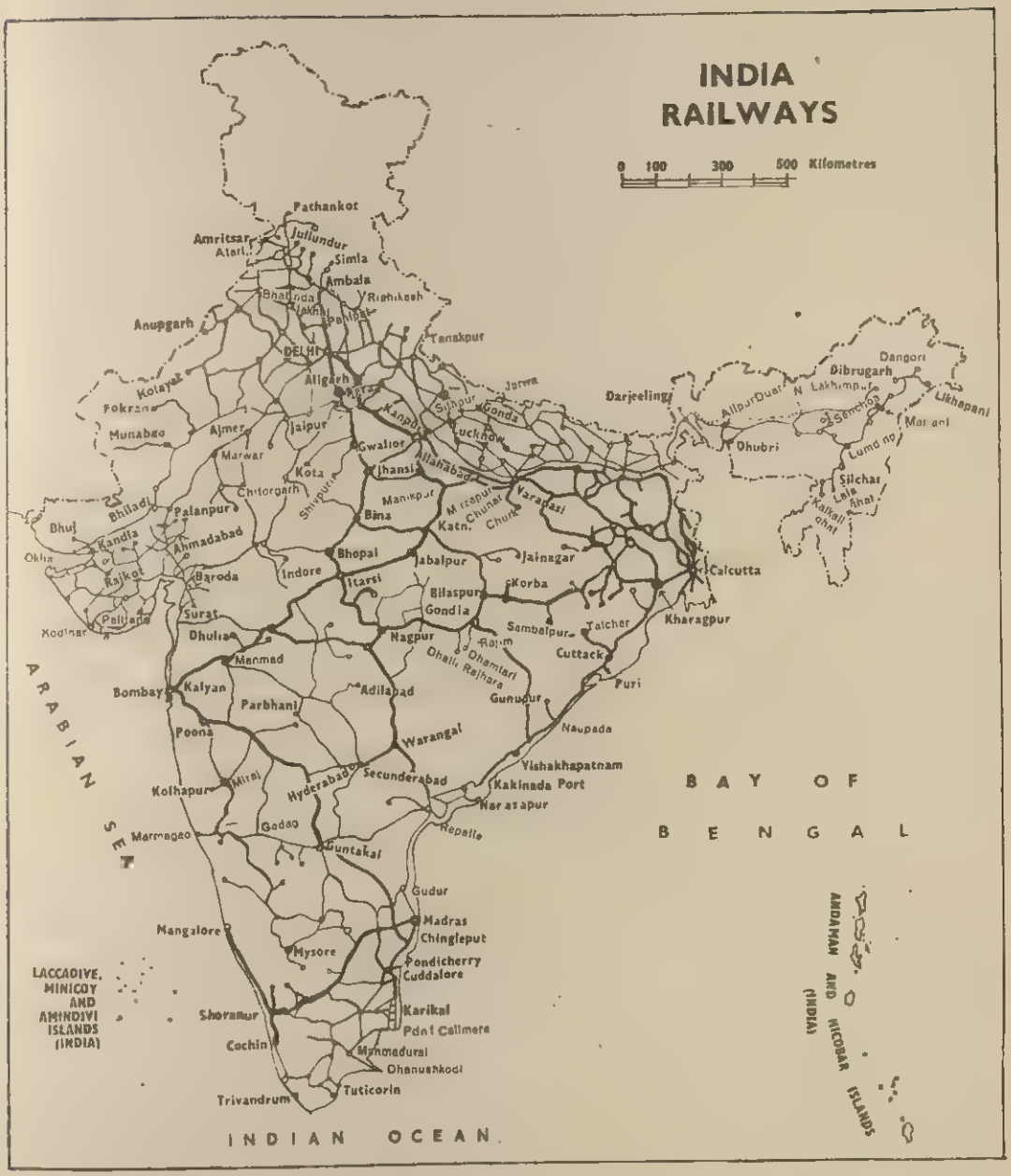
Central Railway: This Railway, with its headquarters at Bombay, consists of 6,149 km of broad gauge, 1,546 km of metre gauge and 1,167 km of narrow gauge lines which serve parts of Maharashtra, Madhya Pradesh, Andhra Pradesh and Tamil Nadu. The more important lines in this zone are : (*i*) Bombay to Delhi (*via* Bhusawal, Khandwa, Itarsi, Bhopal, Jhansi, Agra and Mathura) and link lines between Itarsi—Nagpur, Allahabad; (*ii*) Bombay to Raichur *via* Poona; (*iii*) Delhi to Vijayawada *via* Itarsi, Nagpur, Wardha and Kazipet.

Western Railway: This Railway also has its headquarters at Bombay. It has 2,855 km of broad gauge, 5,986 km of metre gauge and 1,223 km of narrow gauge lines which serve Maharashtra, Gujarat, Rajasthan, and part of Madhya Pradesh. The principal broad gauge lines are: (*i*) Bombay to Delhi (*via* Surat, Baroda, Ratlam, Nagda, Bayana, Bharatpur and Mathura); and (*ii*) Bombay to Ahmedabad (*via* Surat and Baroda) with a link line connecting Surat and Bhusawal. The metre gauge lines connect (*i*) Ahmedabad and Delhi *via* Abu Road, Beawar, Ajmer, Jaipur and Alwar; (*ii*) Porbandar and Dhoka; (*iii*) Rajkot and Veraval; (*iv*) Kandla and Bhuj; and (*v*) Surendranagar and Okha.

Southern Railway: This Railway, with its headquarters at Madras, has 6,717 km of metre gauge, 3,194 km of broad gauge, and 154 km of narrow gauge lines. It serves the whole of Tamil Nadu, Mysore and Kerala and parts of Maharashtra and Andhra Pradesh. The region is highly productive and densely populated. The freight movement consists of grain, cotton, oilseeds, salt, sugar, tobacco, timber and hides and skins. The principal broad gauge lines are: (*i*) Madras to Gudur; (*ii*) Madras to Raipur *via* Cuddappah; (*iii*) Madras to Bangalore; and (*iv*) Jalarpet to Mangalore. The metre gauge lines connect Madras—Dhanushkodi and Madras—Trivandrum.

South Central Railway: Formerly part of Southern and Central Railway, this railway has main lines between Dhond and Madras (445 km), Wadi and Kazipet (325 km), Kazipet and Vijayawada (454 km), Vijayawada and Madras, and Madras and Waltair (644 km).

Present Position of Railways: Up to the end of March 1962, 1,417 km of railway lines were electrified around Bombay, Madras and Calcutta. A small section of the railway system is also operated by diesel engines. Although railway construction and development have been making rapid progress in recent years, industries also are expanding very fast. The total freight traffic on the railways increased from 93 million tonnes in 1950-51 to 194 million tonnes in 1964-65, that is by 109 per cent. The passenger traffic during the same period increased from 1,284 millions to 1,992 millions. The present freight capacity of the Indian Railways is inadequate for the growing needs of industry and trade. Besides high costs involved, railway development is also hampered in some



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areas due to the problem of rail-road competition. Taken as a whole, India needs more railway transport facilities to provide quicker movement of wagons and to relieve congestion in certain sections. As compared to western countries, the Indian railway system has not made much headway so far. The ratio of population to railway route length is 528 to 1 in the U.S.A., 1,242 to 1 in the U.K. and 5,466 to 1 in India.

The Fourth Plan estimates that the total railway traffic in 1970-71 will be 304 million tonnage. To cope with this volume, there will be procurement of 2,177 locomotives, 163,250 wagons and 8,282 coaching vehicles as well as construction of 2,200 km of new lines and conversion of 460 km of metre gauge lines into broad gauge.

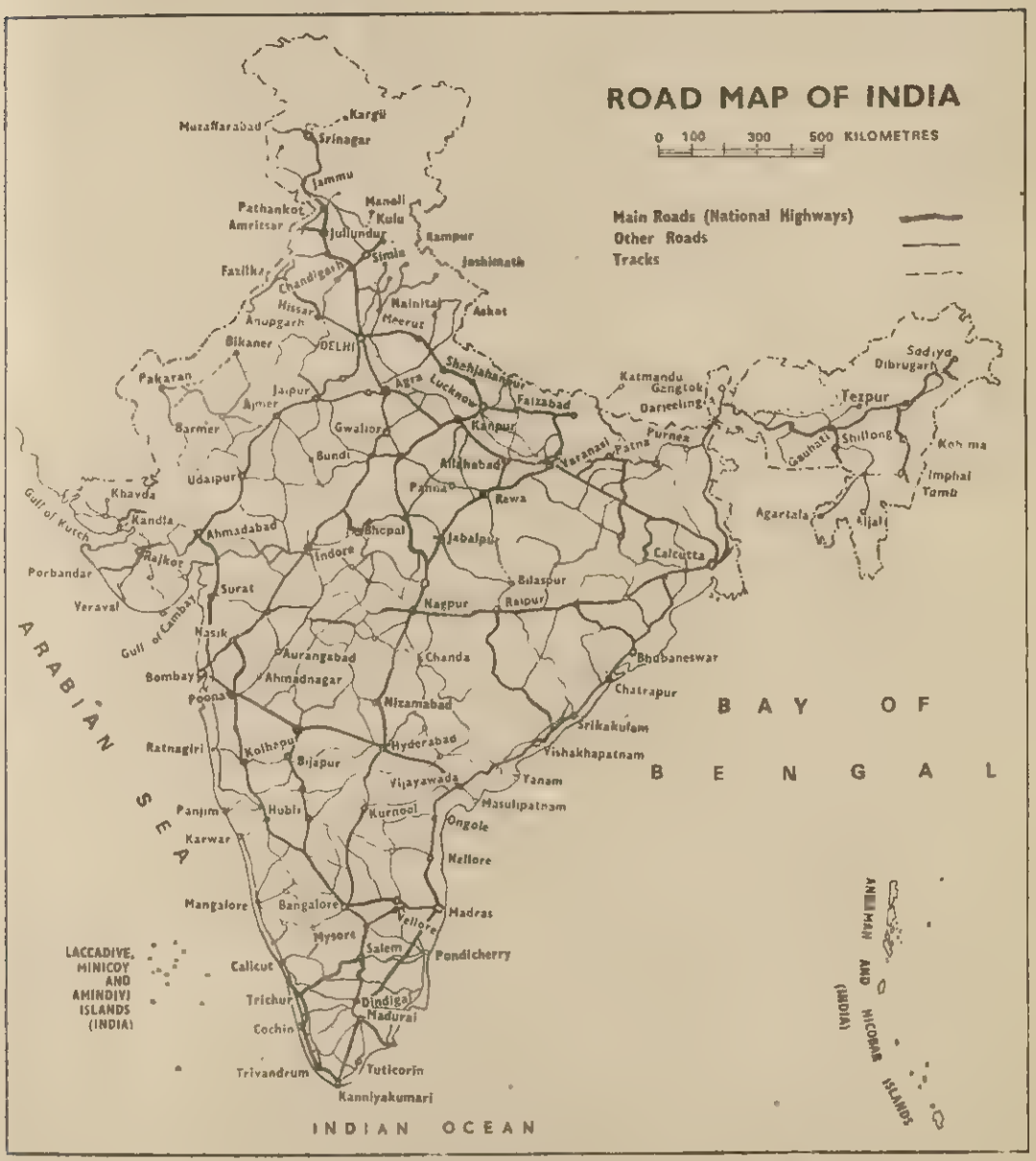
Road Transport

Next to railways, road transport is now the major means of inland carriage in India. The volume of goods traffic handled by motor transport is increasing steadily and it forms about 34 per cent of the railway traffic. But, by international standard, the Indian roads are still not very well developed. In India there are 5 km of roadways for every 100,000 people; in the U.S.A. there are 4,052 km, in France 1,504 km, and in the U.K. 644 km. As regards the intensity of road development. India has only 22 km of roads per one hundred square km of territory compared to 350 km in the U.K. Again, while the Indian roads handle only 14 to 15% of the total volume of surface transport, the proportion of total traffic handled by the roads is 69% in Italy, 56% in the U.K. and 52% in Australia.

India has more than 752,000 km of roads, of which 250,000 km are surfaced and 300,000 km unsurfaced. Roads have an important role in national and regional development. The Fourth Plan has highlighted the need for rural roads, roads in backward areas, and roads in areas having major industrial, mining and other development projects. The roads may be classified into four categories: (*i*) National Highways, (*ii*) State Highways, (*iii*) District Roads and (*iv*) Village Roads. The national highways are developed and maintained by the Central Government. State highways as well as the district and village roads are the responsibility of the State Governments.

There are a number of national highways in India with a total length of about 25,000 km which serve inter-state long-distance traffic. The more important of these highways are : (*i*) Calcutta to Pathankot *via* Varanasi, Kanpur, Delhi and Ambala; (*ii*) Calcutta to Madras; (*iii*) Madras to Bombay *via* Bangalore; (*iv*) Bombay to Delhi *via* Agra; and (*v*) Calcutta to Bombay *via* Nagpur. In addition, there are also national highways connecting Varanasi—Nagpur—Hyderabad—Cape Comorin, Ahmedabad—Kandla, Ambala—Shipki La on the Tibet border, and Gauhati—Makum and Saikhoa Ghat. Many of these highways have been made longer in recent years by connecting the missing links and building bridges over big rivers.

The state highways are the main arteries of commerce within the States. The total route length of state highways is 62,051 km (1961). Maharashtra, Andhra Pradesh, U.P., Mysore, Bihar and Madhya Pradesh have 9,838 km, 7,932 km, 7,081 km, 5,956 km, 4,506 km and 4,458 km respectively. The district and village roads serve the interior rural areas by linking the villages with the highways and railway stations. But these are mostly unsurfaced roads, and cannot be used during the rainy season. A long-term plan has been prepared with a view to increasing the length of the national highways to 51,200 km by 1980. This, it is expected, will provide a network of roads over the entire country so that no place will be more than 60 to 96 km from a national highway. This plan aims at bringing every



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village within the shortest possible distance of some road. In the developed agricultural areas, the aim is to bring every village within 6 km of metalled road and 2.5 km of any road. In the semi-developed areas, every village will be within 13 km of a metalled road and 5 km of any road, while in the underdeveloped and uncultivated areas, every village is to be within 19 km of a metalled road and 8 km of any road. On the completion of the plan, India will have 32 km of roads per 100 square km of territory compared to 22 km at present.

Handicaps of Road Transport: One of the greatest handicaps of road transport in India is the inadequacy of good all-weather roads. India not only requires more roads but also the improvement of the existing roads, particularly of the district and village roads. The future road system of the country should be well-balanced with regard to the needs of rural as well as urban areas. Overcrowding of cities and migration of people from the villages to the cities are often due to the lack of good road communications in the rural areas.

The inadequacy of vehicles is another handicap of road transport in India. At the end of March, 1963, there were 822,364 motor vehicles on roads consisting of 107,000 cars and jeeps, 65,985 private service vehicles, 24,200 motor cars, 203,901 goods vehicles and 43,144 miscellaneous vehicles. The density of motor vehicles per km of road is only 0.93 in India, while it is 13 in the U.S.A., 15.5 in the U.K., 8 in Malaysia, 5 in Ceylon and 3.7 in the Philippines. However, the number of motor vehicles has been increasing very fast in recent times. Between 1947 and 1963, the number of vehicles has increased more than three times.

A very serious problem which has continued to hamper the growth of both railways and roadways is the lack of co-ordination in their development together with unhealthy rail-road competition. The roads are great feeders of the railways. They link up the interior local markets with the nearest railway station. The Government of India has recently adopted a transport co-ordination policy which lays down that the expansion of roadways should be made in such a way that they may become feeders of railways and not their competitors. The railways should thus concentrate on long-distance bulk transport and leave short hauls for the roads.

Passenger transport by roads is now operated as public undertakings in most urban areas. The operation is either carried on by the State Transport Departments or by Municipal Corporation or by Transport Boards and similar public organisations. Goods transport in the private sector is managed and operated by private businessmen. To ensure proper co-ordination between the different modes of transport and between the Central and the State policies on transport development, the Government of India has set up a Transport Development Council and a Central Transport Co-ordination Committee.

Water Transport

Inland Waterways : Before the advent of the railways, the rivers of Northern India handled a considerable portion of the country's inland trade. But inland navigation received a great setback with the development of railways and modern road transport. Inland water transport in India is thus of minor importance now. It handles only 1% of the railway goods traffic and carries an estimated volume of 2.5 million tonnes of goods.

The great disadvantage of the rivers in India is that they usually enter the sea in shallow, sandy delta-mouths instead of broad and deep estuaries so as to offer a passage for steamships to move into the

interior. One of the main causes for the decline of navigation in India has been the withdrawal of water in dry weather when hardly any water is left for navigation for hundreds of km below. Besides, there are a large number of rivers in the country whose dry-weather discharge is so low that navigation is not possible for the greater part of the year.

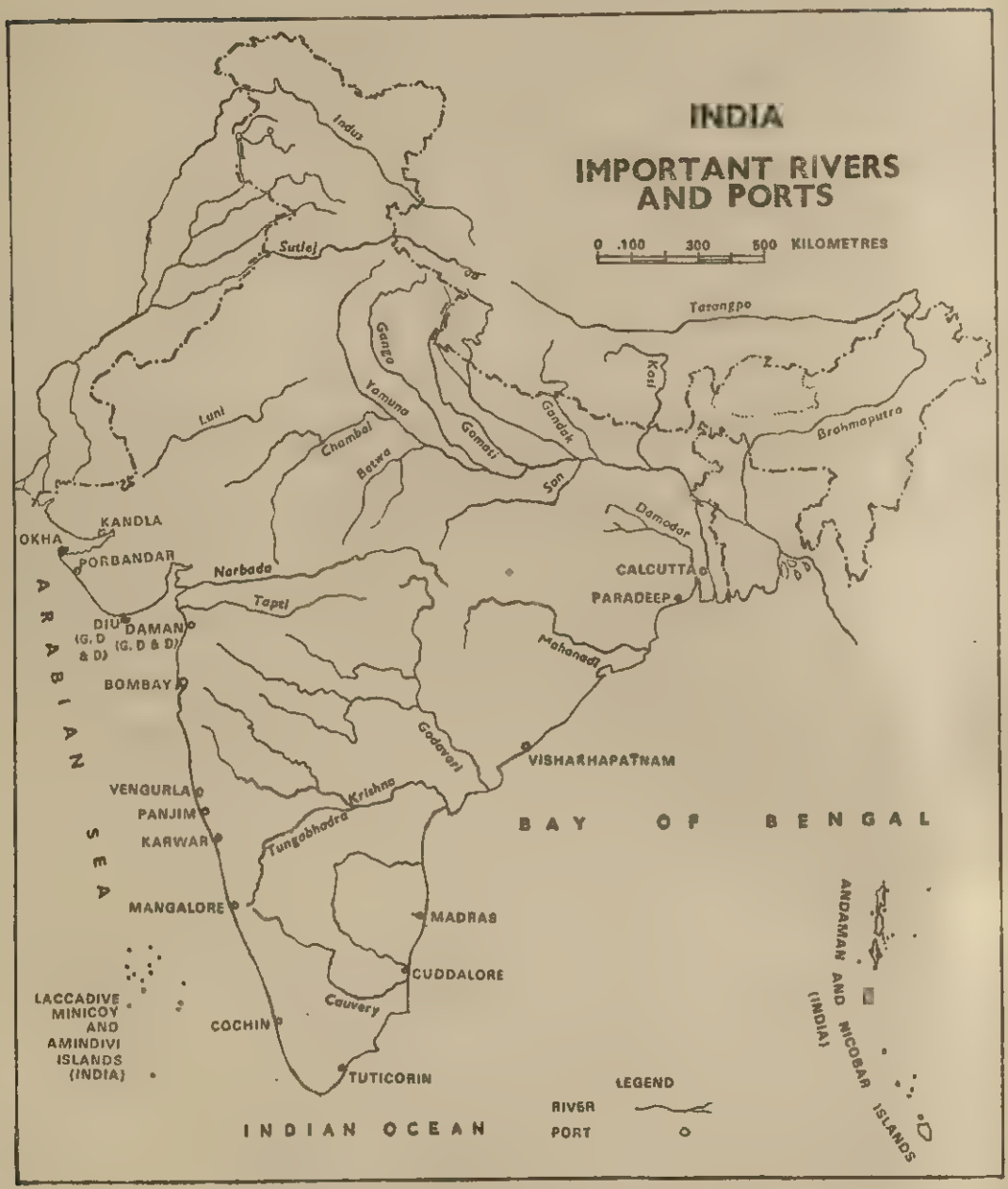
The length of the navigable waterways in India is about 13,500 km. The imporatnt waterways are the rivers Ganga and Brahmaputra together with their tributaries, the Godavari and Krishna and their canals, the backwaters and canals of Kerala, the Buckingham canal in the States of Tamil Nadu and Andhra Pradesh, the west coast canals, and the Mahanadi canals in Orissa. The Ganga and Brahmaputra river systems carry the largest part of the river-traffic. To coordinate the development of water transport on these rivers, the Central and State Governments (U.P., Bihar, West Bengal and Assam) have jointly set up the Ganga-Brahmaputra Water Transport Board.

At present 2,500 km of rivers are navigable by mechanically propelled steamers and vessels, while 5,700 km are navigable by large country boats. Navigation can be developed on the shallow stretches of rivers by deepening their beds, dredging, and the use of specially designed crafts for shallow waters. Deepening of beds and dredging operations involve heavy expenditure. Greater attention is, therefore, being given to the use of specially designed crafts which can ply in shallow waters.

From the point of view of river transport, the Ganga is the most important river in India. It is 2,580 km long. For about 800 km from its mouth, the river maintains a nearly uniform depth of about 9 metres. Steamers can thus move up to Patna from Calcutta. Country-boats can move up to Hardwar. However, the river has lost much of its importance as a highway of commerce because of the development of railways. The more important tributaries of the Ganga—the Gomti, the Gagra and the Gandak—are on its left bank, while the Yamuna, the most important tributary, runs parallel to the Ganga for 1,385 km up to their confluence at Allahabad. The river Bhagirathi—the name by which the main stream of the Ganga is known in West Bengal—and its lower course, the Hooghly, have declined in importance as a waterway on account of reduced water-flow and increased salinity and silting of the beds by tidal actions. This has not only affected the supply of drinking water to Calcutta but threatens the usability of the port of Calcutta as it is becoming more and more difficult for steamships to move up the river Hooghly. To remove these difficulties, a barrage is to be constructed across the Ganga near Rajmahal, about 38 km below Sahibgunj in Bihar. When the Ganga barrage project is completed, a portion of the Ganga water will be diverted to the Bhagirathi by means of a canal. Thus, the rivers, Bhagirathi and Hooghly, will become navigable throughout the year. The salinity of the river Hooghly will also be reduced by the continuous flow of water.

Next in importance after the Ganga is the river Brahmaputra which flows through the entire length of the Assam valley and joins the Ganga in East Pakistan. The Brahmaputra is navigable throughout the year and there is a regular steamer service up to Dibrugarh, about 1,290 km from the sea. The volume of cargo carried on this route per year is of the order of 914,000 tonnes. But navigation is somewhat dangerous due to strong current after the rains and the formation of new islands, sandbanks and shoals.

The principal rivers of South India are Narbada, Tapti, Mahanadi, Krishna and Cauvery. Of these, the first two flow westward into the Arabian Sea while the others



(i) Based upon Survey of India Map with the permission of the Surveyor General of India.
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(ii) The spellings of names appearing on this map have been taken from various sources.
(iii) The demarcation of the Gujarat-West-Pakistan Boundary is in accordance with the Indo-Pakistan-Western Boundary case. Tribunal Award is in progress (1969).

flow eastward into the Bay of Bengal. All these rivers are seasonal rain-fed rivers, so that navigation, except in the lower reaches, is not possible during the dry season. In the deltas of rivers, Godavari and Krishna, the main waterways consist of the navigable canals. The backwaters of Kerala provide a useful waterway between Cochin and Quillon.

The more important navigable canals in India are: (*i*) the Circular and Eastern Canals in Bengal, (*ii*) the Ganga Canal running from Hardwar to Kanpur, (*iii*) the Buckingham Canal along the east coast in Tamil Nadu and Andhra Pradesh, (*iv*) Orissa Coast Canal, and (*v*) the West Coast Canal in Kerala.

The need for waterways in India is very great. In spite of physical difficulties much improvement can be made in the existing waterways of the country. Their development would not only remove the congestion in railway traffic but also open up many new areas whose products cannot be moved at present because of high railway freight.

The Fourth Plan envisages the productive use of potential waterways in a number of regions, more particularly in Assam and Kerala. Waterways will be viewed as an integral part of the over-all transportation system of each region.

Shipping

India has a coastline of over 5,635 km and merchant ships from various countries call at her ports. The sea-routes radiate mainly from the six major ports of Calcutta, Madras, Bombay, Visakhapatnam, Cochin and Kandla. The principal sea-routes are: the Suez Route, the Cape Route, the Australian Route and the Singapore Route.

The Suez Route connects India with Southern and Western Europe, North Africa and the Atlantic coast of North America. The important commodities exported by this route are cotton and jute textiles, tea, metallic ores, oils and oilseeds, hides and skins and tobacco. Machinery, iron and steel manufactures, foodgrains, minerals, oils, chemicals and transport equipment are imported into India by this route. *The Cape Route* connects India with South Africa and parts of West Africa. Sometimes, steamships proceed along this route from India to South America. The traffic on the Cape Route consists of cotton, spices, hides and skins. *The Singapore Route* is next in importance to the Suez Route as regards the volume of trade. This route connects India with South-East Asia, New Zealand, and Canada across the Pacific. The imports coming into India by this route are iron and steel, machinery, timber, dried fish, graphite, porcelain, etc. The exports are chemicals, pig iron, manganese, jute, shellac, mica, plastic goods, toys and engineering goods. The Australian Route which connects India with Australia has become more important in recent times. The goods imported into India by this route are wheat and raw wool.

At the end of December 1964, the total Indian-owned shipping tonnage was 1.39 million GRT—vessels of 471,000 GRT engaged in coastal trade and 916,000 GRT in overseas trade. The Shipping Corporation of India is the biggest shipping organisation having a fleet of 25 dry cargo vessels, two passenger-*cum*-cargo vessels and two coastal tankers. The aggregate shipping tonnage of this organisation is 241,998 GRT.

The cargo vessels of the Shipping Corporation of India operate on several routes: India-Australia, India-Far East-Japan, India-Black Sea, India-Pakistan-Japan, India-Pakistan-U.K.-Continent, India-Poland, and India-U.S.A. The passenger-*cum*-cargo vessels run on Bombay-East Africa and Madras-Singapore routes.

Indian ships at present carry only 8 to 9% of India's overseas trade. The coastal

trade is reserved for Indian shipping; even then, foreign ships are required to participate in the coastal trade during the peak period. However, Indian shipping is making rapid progress on some routes, e.g., fifty per cent of the cargo moving along the India-Burma and India-Ceylon lines is now carried by Indian ships.

The Government of India has given a high priority to the development of Indian shipping. The broad objectives of the shipping plan are : (*i*) to cater fully to the needs of coastal trade and ultimately diverting some traffic from the railways to coastal shipping; (*ii*) to secure an increasing share of India's overseas trade for Indian ships; and (*iii*) to build up a tanker fleet for wet cargo like oil. The expansion of shipping will enable India to save considerable foreign exchange which is now required for the carriage of the country's overseas trade. The coastal shipping is still not fully developed.

Air Transport

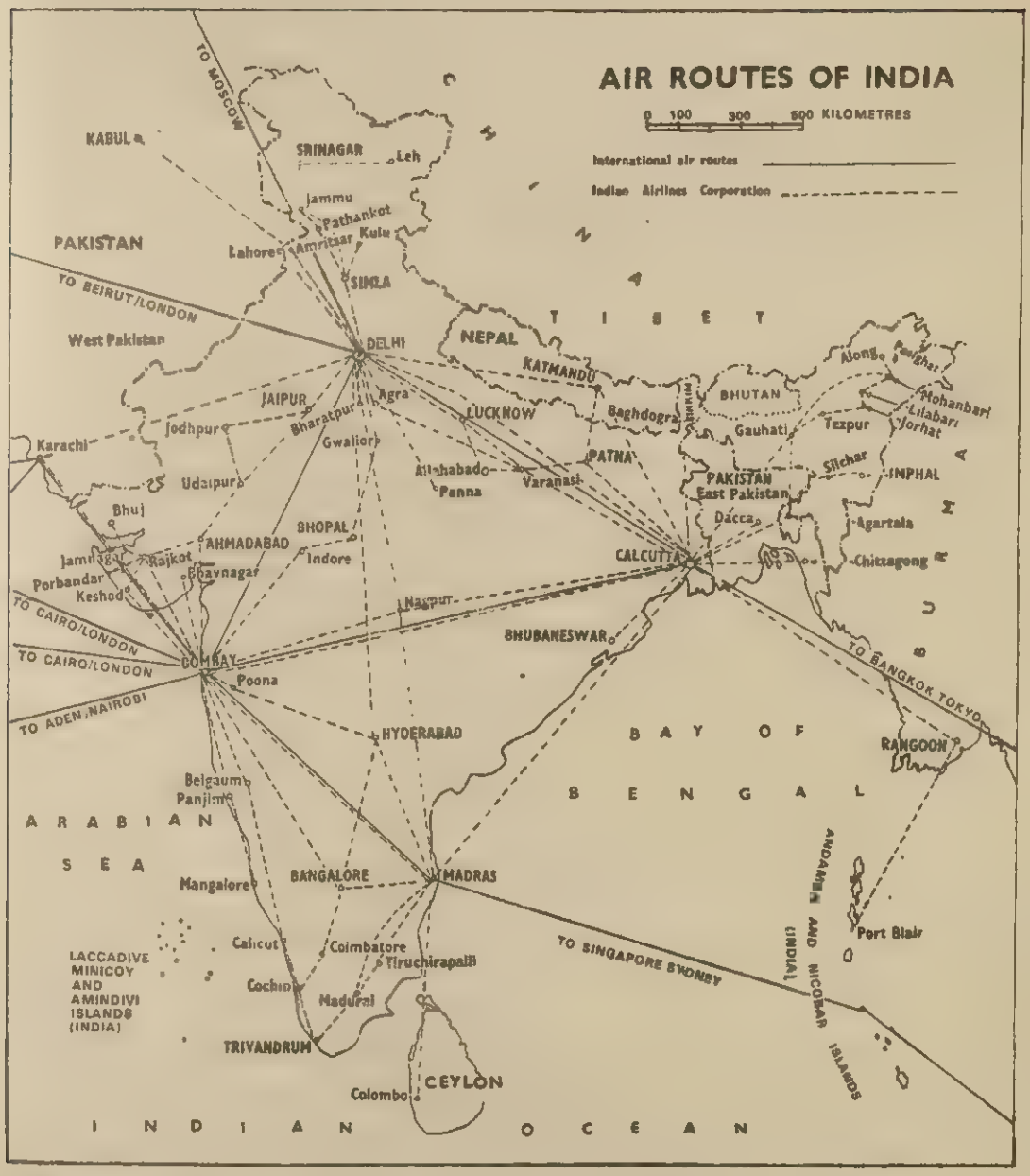
Air transport has come to occupy an important place in the transport system of India. As a meeting point of the air routes between the East and the West, India holds a key position in international airways and has acquired the fourth position in civil aviation in the world. With its vast distances and favourable climate, the country has wide scope for air transport development.

The Government of India nationalised the air-transport undertakings in 1953 and formed two corporations for the operation of inland and overseas air services. One of the corporations, known as the Indian Airlines Corporation, provides air services within the country and to the neighbouring countries, viz., Pakistan, Burma, Ceylon, Afghanistan and Nepal; the other—Air India International Corporation—provides long-distance international services reaching out to 21 countries.

The four centres of Bombay, Calcutta Delhi and Madras are the focal points of Indian air transport to which other centres are connected by local services. The selection of a centre for linking with the principal centres is made not only on the basis of the availability of landing ground but also its commercial importance and possibilities of traffic. Thus Bombay services connect Madras, Ahmedabad, Delhi, Calcutta, Bangalore, Hyderabad, Rajkot, Belgaum, and Cochin, besides Colombo and Karachi. Delhi has daily services to Bombay, Calcutta, Madras, Srinagar, Ahmedabad as well as Karachi and Lahore. Calcutta lines serve Bombay, Delhi, Madras, Gauhati, Dacca and a number of other cities. Madras routes connect Calcutta, Delhi, Bombay, Hyderabad, Bangalore, Cochin, Trivandrum, Coimbatore, Madurai, etc.

The external air services of India now connect all the neighbouring countries in Western and Eastern Asia as well as Europe and North America. The more important overseas air ruotes from India are : (*i*) India-U.K.-U.S.A.; (*ii*) India-East Africa; (*iii*) India-Japan; (*iv*) India-Australia; and (*v*) India-U.S.S.R.

There are more than eighty-two airports controlled and operated by the Civil Aviation Department of the Government of India. Two new airports at Raxaul and Jogbani in Bihar are under-construction. The most important airports are Bombay (Santa Cruz), Calcutta (Dum Dum) and Delhi (Palam) which are maintained at international standards. There are major airports at Ahmedabad, Agartala (Tripura), Hyderabad, Gauhati, Madras, Nagpur and Tiruchirapalli. Besides, there are as many as 41 intermediate airports and 30 minor airports. Civil aerodromes are expected to be constructed at 14 other places, viz., Ajmer, Aligarh, Salem, Berhampore, Calicut, Cuddalore, Dehra Dun, Hubli, Mangalore, Nellore, Ootacamund, Ratnagiri, Sagar and Surat.



The demarcation of the Gujarat-West Pakistan Boundary is in accordance with the Indo-Pakistan-Western Boundary case. Tribunal Award is in progress (1969).

Besides the international services operated by the Air India International, a number of foreign airlines also operate air services in India. There are, for example, the British Overseas Airways Corporation (B.O.A.C.), Trans-World Airlines (T.W.A.), Air France, Pan-American World Airways, Scandinavian Airlines, Air Ceylon, Philippines Airlines and Pakistan International Airlines. India has concluded air transport agreements with a large number of countries, viz., Afghanistan, Australia, Ceylon, Czechoslovakia, the U.A.R., France, Italy, Japan, the Netherlands, Pakistan, the Philippines, Sweden, Switzerland, Thailand, Iran, the U.S.A., the U.K., and the U.S.S.R.

Extension of air services in India will naturally depend upon the rate of her economic progress. But there are two serious handicaps which may restrict the growth of civil aviation in this country. One is the high cost of aviation petrol which is an important element in the cost of operation; the other is the small number of industrial and business centres as compared to the size of the country.

The Fourth Plan provides for Rs. 118 crores for the development of air transport. The available capacity in tonne km of internal services is expected to increase from 155 to 345 million by 1970-71. During the same period, external services are likely to show an increase from 338 to 594 million tonne km.

Conclusion

India has all types of transport that are in use all over the world. The railways have made it possible to bring in a consolidated national economy by removing distance between places, carrying and distributing goods, facilitating mobility of labour, and reducing the chances of famines. There are four types of transport in India—railways, inland waterways, shipping and airways. It is the aim of the railways to provide a service which must be safe, economical and efficient. The programmes in hand for the railways are designed to double the tracks, convert metre-gauge lines into broad gauge, introduce electrification on several sections, construct new lines and renew obsolete tracks. The road transport has proved very serviceable because of automobile trucks, lorries and cars. But the automobile services have also brought about unhealthy competition with the railways, thus necessitating a proper coordination between the two systems.

Although inland waterways on modern lines have limited areas of operation, they play a significant role in Assam, West Bengal and Bihar. Further development by way of dredgings and deepening of rivers and canals will make the waterways more serviceable throughout the year.

The Indian mercantile marine has increased, of late, its total tonnage and the Indian ships have entered the overseas trade. To develop shipping, extensive plans have been prepared for the development of ports.

So far as air transport is concerned, all important towns are connected by air. Efforts are being constantly made to ensure the safety and reliability of air services. Uneconomic competition has been eliminated through nationalisation so as to get the maximum benefit from the air services.

Questions and Discussion Topics

1. *Draw a sketch map of India and show on it:—*
   (*a*) *the important railway routes,*
   (*b*) *the navigable water-ways, and*
   (*c*) *the national highways.*

2. *Explain briefly the way in which the forces of economic geography have influenced the formation of railway route pattern in India.*

3. *To what extent are conditions in India favourable for the development of air transport ?*

4. *Give a comparative account of the importance of railways, roadways, and waterways in the transport system of India.*

5. *Do you think that India should pay more attention to the development of railways than the construction of roads ? Why ? Give reasons for your answer.*

6. *What are the principal sea-routes of India ? Which route is the most important for India ?*

7. *Describe and account for the principal sea-routes of India.*

8. *Explain how the slow development of roads in India has become a serious weak-point in her economic structure.*

9. *Give an account of the development of air transport in India. What additional places of commercial and industrial importance should, in your opinion, be linked by air services ?*

Chapter 14

Foreign Trade

India's Share in World Trade

No country is self-sufficient with regard to all its requirements. The need for international trade (i.e. trade between nations) arises from this basic limitation. Countries exchange each other's products so as to dispose of their own surplus goods in exchange for goods which they require to meet their needs. Thus, the foreign trade of a country consists of buying goods (imports) from and selling goods (exports) to other countries. The imports and exports of a country are influenced by a number of economic factors, internal and external. Production, demand, government policies, and the industrial development programmes influence the composition and direction of imports and exports.

India is the main supplier of ilmenite, mica, monazite, zircon, and jute goods in the world; it has large exportable surplus in iron ore, manganese, oilseeds, tea and cotton piece-goods. On the other hand, it needs such important products as machinery, petroleum, metals, chemicals, etc. India's share in the world trade, however, has been very insignificant. The percentage share of India's external trade in the world was only one in 1965.

Export Trade—Its Characteristics: The composition of India's exports changed very significantly after the partition of the country in 1947. Formerly, her exports consisted mainly of agricultural commodities and industrial raw materials, including raw cotton, jute, oilseeds, tea and minerals. After partition, cotton textiles, jute manufactures and tea formed the major export items. Other exports consisted of minerals and mineral ores, vegetable oils and oilseeds, hides and skins, etc.

The characteristics of India's export trade at present may be outlined as follows :

(*i*) India's exports have not shown any significant rise in earnings during the last few years.

(*ii*) The traditional items of export like tea, jute manufactures, cotton textiles, etc., are being increasingly supplemented by certain non-traditional and new manufactured goods.

(*iii*) The greater part of India's exports goes to a few countries. The four important buyers of Indian goods are the U.K., the U.S.A., the U.S.S.R. and Japan which took between them 55 per cent of India's exports in 1964-65.

(*iv*) Of late, exports to Eastern European countries have been increasing more rapidly.

(*v*) Although the world trade is on the increase, India has lost some markets to other countries because of her inability to compete.

The traditional items of Indian export are cotton piece-goods, jute goods, tea, leather goods, tobacco, spices, mica, coffee, manganese and iron ore. Though the items based on agricultural production constitute the bulk of India's exports, most of them are relatively stagnant or declining. Export of minerals and new manufactured goods has

increased considerably in recent years. Some of the items like bicycles, sewing machines, electric fans and engineering goods hold out tremendous export possibilities for the future. Our export performance in consumer goods such as soaps, paints, woollen fabrics, rayon, footwear, vegetable oils, medicines and pharmaceuticals is also improving.

Value of Exported Commodities

The principal commodities exported from India in 1950-51, 1960-61 and 1965-66 were the following :

Commodity Exported	1950-51	1960-61	1965-66
	(In millions of Rupees)		
Jute yarns and manufactures	1140	1352	1816
Tea	804	1236	1148
Cotton piece-goods	1181	576	552
Leather	260	249	282
Raw hides and skins	96	95	95
Iron ore	2	170	421
Manganese ore	80	140	114
Mica	100	102	113
Raw cotton	50	87	131
Sugar	..	24	118
Coffee	14	72	129
Oilcakes	..	143	346
Coal and coke	36	33	28
Spices	..	166	231
Tobacco	141	146	196
Cashew kernels	86	189	274
Coir fibre	109	87	106
Total (including other commodities)	6066	6683	8096

Export Markets

The countries to which Indian exports are sent are as follows:

Commodities	*Countries*
Jute manufactures	U.S.A., U.K., Australia, Argentina and Canada. (Jute manufactures accounted for about 21 per cent of India's total exports in 1964-65)
Cotton manufactures	Burma, Ceylon, U.A.R., Iran, Iraq, U.K., West Germany and France
Tea	U.K., U.S.S.R., Canada, Australia, U.S.A., Iran and Saudi Arabia
Hides and skins	U.K. and U.S.A.
Oil seeds and oils	U.K., U.S.A., Canada, Australia, Italy, Belgium, Iran and Ceylon
Iron ore	U.K., Japan, East European countries, and Italy
Manganese	U.S.A., U.K., Japan, West Germany, France and Italy
Mica	U.S.A. and U.K.
Sewing machines, electric fans, bicycles, etc.	East Africa, Indonesia, Malaysia, Iran, Iraq, Afghanistan and U.A.R.

Direction of Export on the Basis of Percentage

	1960-61	1965-66
U.K.	26·1	18·1
U.S.A.	15·5	18·3
U.S.S.R.	4·4	11·5
Japan	5·4	7·0
Canada	2·7	2·5
Australia	3·4	2·2
West Germany	3·0	2·2
Ceylon	2·8	..
U.A.R. (Egypt)	2·0	3·3
Italy	1·4	1·0
Pakistan	1·6	0·6
Total (including other countries)	100	100

Export Promotion Drive

In recent years, a good deal of attention has been devoted to the problem of export promotion through lower production costs, reduced freight rates, export credit guarantee, setting up export houses, etc.

Import Trade—Its Characteristics: The import trade was under some strain after the partition of India in 1947. The jute and cotton manufacturing industries were mainly located in India while large areas producing raw jute and cotton were included in Pakistan. The wheat-growing areas of the British province of the Punjab also went to Pakistan.

This led to a sudden increase in the imports of raw cotton, jute and foodgrains. But the Government took immediate steps to restrict the imports of non-essential goods and increase the production of raw jute and cotton. Before partition, imports consisted primarily of manufactured consumer goods. In recent times, industrial raw materials, foodgrains and capital goods (machinery and equipment) have become more important items of import.

The characteristics of India's import trade may be enumerated as follows:

(*i*) *Import of Foodgrains:* In spite of her best efforts, India has not been able to free herself from the necessity of large imports of foodgrains. India imports wheat from the U.S.A., Canada and Australia, and rice from Burma, Thailand, the U.S.A., etc. Recently the import of foodgrains has increased because of the fall in internal production and the increase in consumption.

(*ii*) *Predominance of Machinery and Equipment:* India is engaged in setting up new industries and modernising industries like jute, sugar and cotton. Hence imports of heavy machinery and equipment have become necessary. There are considerable restrictions of imports of items which are being manufactured in the country or the production of which has expanded recently. In 1965-66 the imports of machinery and transport equipment cost Rs. 489.4 crores out of the total imports valued at Rs. 1394 crores.

(*iii*) *Decline in the Import of Raw Materials and Consumer Goods:* As already mentioned, the partition of the country made it necessary to import large quantities of raw cotton and raw jute to meet the internal requirement. Slowly the import of these materials is declining with the increase in internal production, and India has almost become self-sufficient in jute. Restrictions over the import of consumer goods (particularly luxury articles) have become inevitable due to the small export earnings and requirements of large imports of capital goods.

Value of Imported Commodities

The value of the principal commodities imported into India in 1960-61 and 1965-66 are given below:

Commodities	1960-61	1965-66
	(in crores of rupees)	
Iron and Steel	122·5	97·8
Non-ferrous metals	47·3	68·6
Electrical Machinery	57·2	87·1
Machinery other than electrical	203·4	332·4
Transport equipment	72·4	69·9
Mineral fuels	69·5	68·3
Raw cotton	81·7	46·2
Raw Jute	7·5	5·6
Chemicals	39·3	35·8
Fruits and vegetables	20·4	22·7
Cereals	181·4	309·1
Fertilisers, crude and manufactures	12·1	44·8
Total (including other commodities)	1139·7	1394

The U.S.A., the U.K., West Germany and Japan account for more than 60% of India's imports. The percentage of imports from principal countries are given below for the years 1960-61 and 1965-66.

	1960-61	1965-66
U.S.A.	28·7	37·7
U.K.	19·1	10·7
West Germany	10·8	9·8
Japan	5·3	5·7
U.S.S.R.	1·4	5·9
Canada	1·8	2·2
Pakistan	1·2	0·4
Australia	1·6	0·2
Total (all countries)	100	100

The sources of some of the more important commodities are given below:—

Machinery: The chief suppliers are the U.K., the U.S.A., West Germany, Japan and France.

Mineral Oil: Iran, Iraq, Saudi Arabia, Burma, Indonesia and the U.S.A. are the chief sellers of mineral oil to India.

Paper and Paper-Board: These are imported mainly from the U.K., Norway, Sweden, West Germany and the U.S.A.

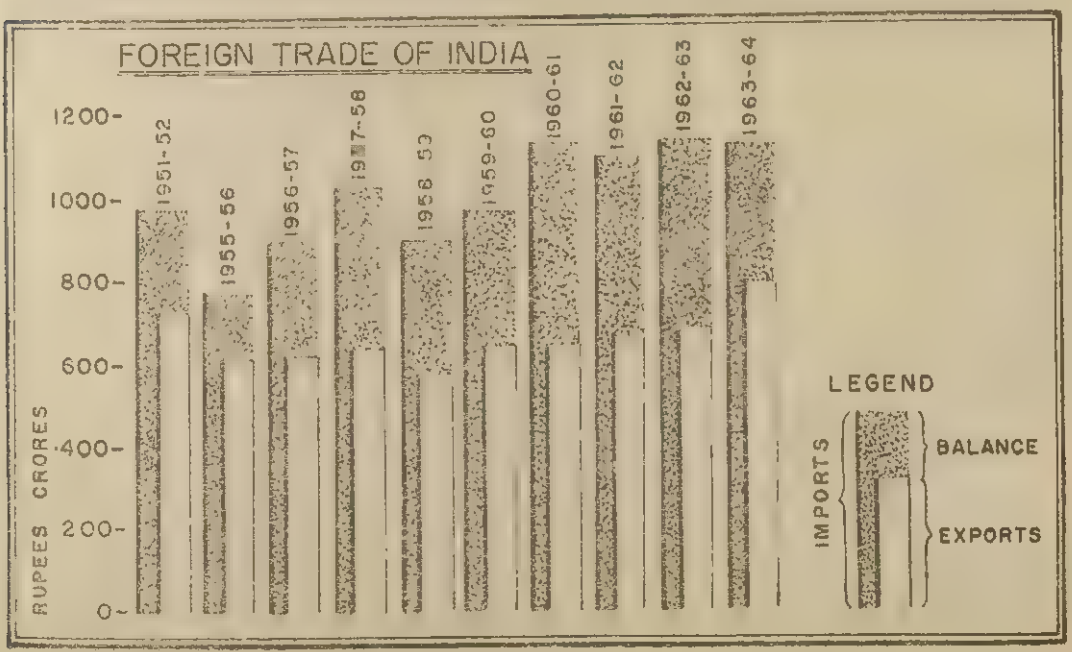
Chemicals: The suppliers of chemicals are the U.K., West Germany, Japan and the U.S.A.

Raw Cotton: India imports raw cotton from the U.A.R., the U.S.A., Kenya and Pakistan.

Grains and Flour: The suppliers of foodgrains and flour are Canada, Australia, Burma, the U.S.A., Argentina, Thailand, and the U.A.R.

Balance of Trade: The difference between the values of exports and imports is known as the 'balance of trade'. When exports exceed imports, a country is said to have a favourable trade balance. On the other hand, if imports exceed exports, the balance of trade is said to be unfavourable or adverse. The balance of trade has continued to be adverse for India throughout the period of planned economic development. This has been so partly due to the increased imports of capital goods and industrial raw materials for the development projects and large imports of foodgrains to meet the domestic food shortage, and partly due to India's inability to increase its export earnings adequately. To meet the deficits in trade, non-essential imports have been cut down to the minimum, and measures for export promotion are receiving increased attention of the Government. Recently the rupee has been devalued, and it is expected to increase the export trade.

Entrepot Trade: The *entrepot* trade of a country consists of the re-export of goods previously imported. India has a large *entrepot* trade. Being at the centre of the Eastern Hemisphere, it occupies a very favourable geographical situation for the purpose of doing *entrepot* trade. This trade has not, however, increased very much because of a tendency to develop direct trade relations between countries.



Conclusion

Foreign trade is essential for the economic development of the country. The characteristic features of the foreign trade of India are that it is the importer of some of those agricultural products which it used to export before the partition, that there has been an enormous increase in the volume and value of trade and that she has a continuous adverse balance of trade. Partition, food imports, purchase of machinery, and difficulties in the promotion of exports are the reasons for the adverse balance of trade. India's commercial policy aims at restricting imports, increasing exports in several directions and maintaining continuity in trade policy to develop trade relations with other countries.

In the Fourth Plan period, exports may rise from an actual level of Rs. 810 crores in 1965-66 to Rs. 1929 crores (in terms of post-devaluation rupees). The principal increases in exports will be in tea, iron ore, engineering goods, jute manufactures, fruits and vegetables, vegetable oils (non-essential), oilcakes, fish, tobacco, cotton fabrics, iron and steel, and chemicals. The total requirements of imports during the Fourth Plan are estimated at Rs. 12,049 crores (in terms of post-devaluation rupees). The requirements of imports will be mainly for components of machinery and equipment, replacement machinery and spares, and machinery and equipment for projects under the Fourth Five Year Plan. The present restrictions on imports of consumer goods, and of raw materials for consumer goods industries will continue. Steps will also be taken to restrain the growth of demand in respect of commodities such as kerosene and newsprint.

Questions and Discussion Topics

1. *Describe the present pattern of India's foreign trade with reference to the composition and direction of her imports and exports.*

2. *To what countries does India export (a) tea, (b) jute manufactures, (c) cotton textiles, and (d) hides and skins ?*

3. *From which countries does India import (a) machinery, (b) transport vehicles, (c) cereals, and (d) petroleum ?*

4. *What measures will you suggest for increasing India's exports to other countries ?*

5. *Show the general character of imports and exports from Bombay, Calcutta, Madras and Cochin.*

Chapter 15

Ports and Trade Centres

Ports and Trade Centres—Their Importance

Ports and trade centres grow on account of industrialisation for facilitating the interchange of products. As more than 70 per cent of the people in India depend directly or indirectly on agriculture and as the majority of the people live in villages, there are not as many trade centres and ports as one would expect in a vast country like India. There are only 107 cities in India, each with a population of more than 100,000. The largest number of cities are in the States of U.P., West Bengal, Maharashtra, Andhra Pradesh and Tamil Nadu. On account of migration to the newly set-up cities from the countryside due to industrial development, the number of towns and cities is rapidly increasing.

Characteristics of A Port: A port is a place to which vessels resort for purposes of commerce, and which includes a harbour for the shelter of vessels. Harbours are classified as natural or artificial. Natural harbours are those formed by a bay, estuary or river which provide a refuge for ships. Artificial harbours are created through dredging to form an artificial bay.

The region to which a port serves as a "door" is called hinterland. The trading operations of the port of Calcutta are performed for West Bengal and Bihar, and therefore, the hinterland of Calcutta includes these two States. There may be several ports in the same hinterland but traffic will flow to those ports which offer greater facilities for loading and unloading cargo and also for serving the hinterland. Thus, the growth of a port depends on (*i*) the means of communication with the hinterland, and (*ii*) the facilities available at the harbour. The quantity of goods and passenger traffic handled by a port determines its importance.

Types of Ports in India

There are two types of ports in India—major and minor. A major port is one which enjoys (*i*) better accommodation at the port for ships, (*ii*) better communication with different parts of the hinterland, (*iii*) bigger volume of traffic, (*iv*) traffic throughout the year, and (*v*) productive and prosperous hinterland.

Principal Ports

The major ports of India are Bombay, Calcutta, Madras, Cochin, Vishakhapatnam, Kandla, Mormugao and Paradeep (from November, 1966). There are over 150 minor ports of which the following are considered more important : Kakinada, Masulipatam, Cuddalore, Calicut, Mangalore, Tuticorin, Alleppey, Bhavnagar, Porbandar, Bedi Bandar, Broach, Ratnagiri, Okha, Quilon and Surat. There are projects to develop Mangalore and Tuticorin as major ports.

More than 80 per cent of India's sea-borne trade is shared by Bombay, Calcutta, Cochin, Madras and Vishakhapatnam. The volume of traffic in each of these ports is increasing on account of larger exports and imports. Since the handling capacity of a port is dependent on its existing facilities, there is congestion of traffic in most ports. This is because the improvement in the handling

capacity is slower than the rate of increase in traffic.

Handling Capacity of Major Ports

The following table shows the volume of traffic handled by six major ports:

Cargo Handled at Major Ports

(in thousand metric tonnes)

	1955-56		1964-65	
	Import	*Export*	*Import*	*Export*
Calcutta ..	3,464	4,696	6,080	4,980
Bombay ..	6,814	3,657	11,130	5,210
Madras ..	1,862	638	2,990	1,410
Vishakhapatnam	232	1,112	1,910	1,960
Cochin ..	1,241	394	2,260	450
Kandla ..	208	105	2,050	260
Mormugao ..	..	..	220	6,400
	13,821	10,602	26,640	20,670

There are various causes for the concentration of India's ocean-borne trade in the major ports. The first and foremost is the geographical position of the port. Moreover, the historical causes are also responsible for this concentration. Bombay, Madras and Calcutta were the centres of administration during the British regime for quite a long time. The railway systems were constructed from these ports during the latter half of the 19th century. Population increased bringing in its wake commercial and industrial activities. Better handling and storage facilities, quick onward transmission facilities, the nature of hinterland, etc., have led to the concentration of traffic in a few major ports.

The Government of India has realised the importance of avoiding this concentration which has led to unnecessary delay in loading and unloading of ships at ports and has undertaken many projects for the expansion of the facilities at the major ports in addition to the development of minor ports into major ports.

Major Ports on the Western Coast

Kandla, situated at the eastern end of the Gulf of Kutch, is a natural sheltered harbour and is easily navigable. The geographical position of the port is also best suited in its services to the hinterland covering Gujarat, Rajasthan, the Punjab, Haryana, Kashmir and Western U.P.

The need for its development was felt as early as 1946 and the partition of the country made it still more necessary to handle the traffic which was previously handled by Karachi port. Work on the new port of Kandla was taken up in 1949. In 1952, a metre gauge railway line connecting Kandla with the mainland was opened. There is now a national highway connecting Kandla with Ahmedabad. Further expansion facilities at Kandla took place during the Third Plan period. A free trade zone has been established at Kandla and this is likely to increase the volume of trade.

The table below gives an indication of the fast progress of Kandla as a port:—

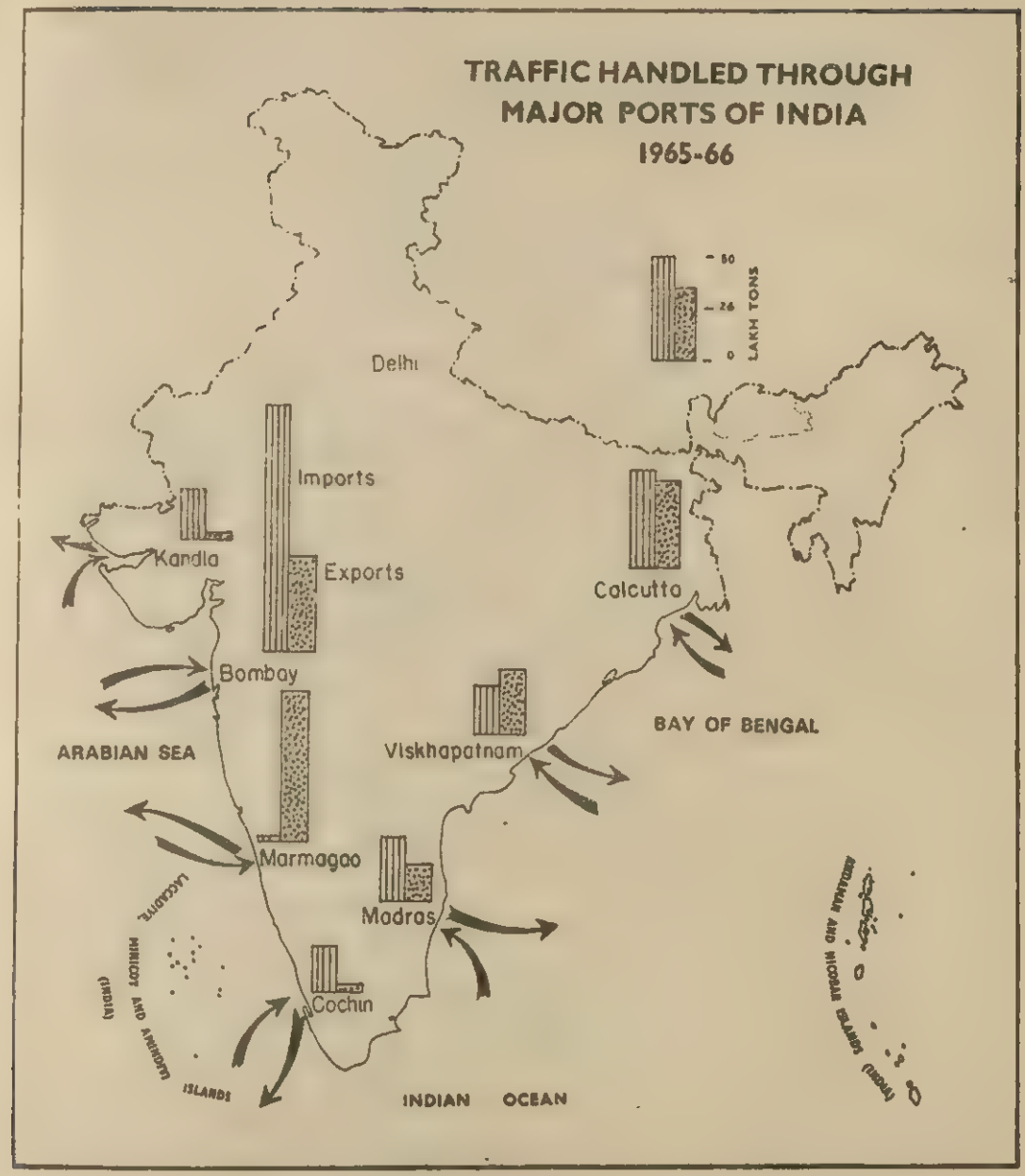
Traffic in Kandla

(in tonnes)

Year	*Import*	*Export*	*Total*
1955-56	205,390	102,512	307,902
1957-58	602,978	235,277	844,255
1959-60	828,047	295,469	1123,516
1960-61	1211,000	336,000	1547,000
1964-65	2,050,000	200,000	2250,000

Kandla has handled 2.25 million tonnes of cargo during 1964-65. The chief imports are mineral oils, foodgrains, chemicals, fertilisers and machinery. The principal items of export are iron ore, zinc concentrates, salt, cotton and bones.

Bombay lies at the base of the Western Ghats. It has a natural harbour directly on the sea. The hinterland extends from the western part of Tamil Nadu in the south to Delhi in the north, and includes Western U.P., Rajasthan, Madhya Pradesh and



The demarcation of the Gujarat-West Pakistan Boundary is in accordance with the Indo-Pakistan-Western Boundary case. Tribunal Award is in progress (1969).

Maharashtra. It is connected with the interior by railways. Oilseeds, wool and woollen goods, hides and skins, manganese ore and cotton manufactures are exported, and the principal imports are machinery, railway plant, iron and steel goods, hardware, dyes and petroleum.

Mormugao in the Union Territory of Goa, Daman and Diu, is about 370 km south of Bombay. It is a fine natural all-weather harbour suitable for vessels of deep draft. Mormugao is connected with Bombay and Bangalore *via* Londa. The principal exports are manganese, iron ore, cashewnuts and castor seeds. Although there are no dry docks, other facilities in respect of anchorage, berths, lighters, etc. are excellent.

Cochin is situated in Kerala and is the most important port between Bombay and Colombo. It remains open for traffic throughout the year. Cochin serves the vast hinterland of Kerala and the southern districts of Tamil Nadu, Mysore and Andhra Pradesh. The principal imports are foodgrains, oil, metals, chemicals and hardware, and exports include coir, yarn, metals, copra, coconut oil, coffee and cashewnuts.

Major Ports on the Eastern Coast

Madras is the chief port of Tamil Nadu. Several railway lines connect it with various parts of the country. It has an artificial harbour, ill-suited to shipping during cyclones which occur in October and November. Its extensive hinterland includes the whole of the Eastern Deccan. The exports are hides and skins, turmeric, tobacco and textiles. The chief imports are coal and coke, foodgrains, minerals, oils, metals, timber, textiles, machinery and chemicals.

There are development projects for mechanical equipment for handling iron ore at the port.

Vishakhapatnam is situated on the Coromandel Coast, about midway between Madras and Calcutta. It caters to the needs of Orissa and the eastern part of Madhya Pradesh. The port is connected by the South-Eastern Railway with Bhilai and Raipur in Madhya Pradesh. It provides access for the crude oil supplies to the oil refinery. The exports are manganese, groundnuts, myrobalans, hides and skins. The imports consist of iron, petroleum and machinery. There is a ship-building yard in the port.

Calcutta is situated on the left bank of Hooghly, nearly 120 km from the Bay of Bengal. It is the greatest trading centre to the East of Suez and its vast hinterland comprises Assam, West Bengal, Madhya Pradesh, Bihar, U.P. and parts of the Punjab, Haryana and Orissa. The port of Calcutta suffers from the disadvantage of its river (Hooghly) being silted up, and the frequent formation of tidal bores in it. There are two important schemes to get rid of these disadvantages. They are: the construction of an ancillary port at Haldia, 89 km down so as to relieve the load on Calcutta; and the construction of a barrage on the river Ganga at Farakka to improve the head-water supply in Hooghly.

The congestion at Calcutta port will be relieved with the further development of Paradip, a new port that is being operated in Orissa. Calcutta with its suburbs is the greatest manufacturing area in India having jute mills, paper mills, cotton mills, sugar factories, rice mills, tanneries, perfumeries and iron and steel works.

The principal exports are jute, tea, mica, coal, iron, manganese and shellac, and the imports are iron and steel goods, petroleum, paper, chemicals, rubber and machinery. The port has handled about 12 million tonnes of cargo during 1964-65.

Trade Centres

In early days, when the volume of commerce was very small, the interchange

of commodities used to take place between individuals at some meeting places. The growth of trade centres originated from the necessity of making the meeting places more permanent. The trade centres are, therefore, places where trade is carried on, and goods are collected, distributed or transferred from one means of conveyance to another. Many cities also become trade centres in course of time. The following types of cities developed into trade centres:

(*i*) Holy cities (e.g., Varanasi, Puri, Allahabad, Mathura, Madurai, Gaya, etc.)

(*ii*) Ancient capitals (Delhi, Poona, Nagpur, Agra, etc.)

(*iii*) Ports (Bombay, Calcutta, Madras, etc.)

(*iv*) Manufacturing cities (Durgapur, Bhilai, Rourkela, Jamshedpur, Bangalore, etc.)

(*v*) Modern administrative capitals (Chandigarh, New Delhi, Bhopal, Cuttack, Hyderabad, etc.)

Principal Trade Centres in Various States

Uttar Pradesh has an area of 294,365 sq. km with a population of about 74 million. It has made fairly good progress in agriculture, industrial manufactures and road development. The principal crops are wheat, sugarcane, mustard, rice and pulses. The State contains at present sugar factories, cotton mills and paper and glass factories. Handicrafts and village industries of U.P. are well-known for brocades and tissue (Varanasi), brassware (Moradabad), woodwork (Saharanpur), clayware (Chunar and Lucknow), durries (Agra and Kanpur) and printed sarees (Farrukkabad). The following are important trade centres: Allahabad, Varanasi, Kanpur, Gorakhpur, Lucknow, Mirzapur, Moradabad, Aligarh, Agra, Dehra Dun and Jhansi.

Allahabad is situated at the confluence of the rivers, Ganga and Yamuna. There are several oil mills, glass factories and flour mills in the city. It is linked with other parts of the country by rail, roads and rivers and this is advantageous from the point of view of trade.

Varanasi is situated on the bank of the river, Ganga. There are several oil mills and silk factories. The place is also noted for brasswork. Chief articles of trade are toys of wood, *zarda*, lac bangles, ivory articles, silk cloth, blanket sheets, linseed, mustard seed, sugar and gram.

Kanpur has the largest number of manufacturing industries in U.P. The important industries are cotton mills, sugar mills, flour mills, iron foundries, chemical works, and oil mills.

Gorakhpur has carpentry as the chief industry and a number of sugar mills. Timber is brought here from Nepal border.

Lucknow is an important distributing centre for the rich agricultural products of Oudh. The articles of trade are silver and gold works, ivory and wood-carving, pottery and perfumes.

Mirzapur has carpets, rug and silk cloths as the manufactures and is also famous for stone business.

Moradabad is noted for brassware.

In *Agra*, the articles of trade are carpets, shoes, brass utensils, looking glass frames and marbles. Agra is also a collecting and distributing centre for Rajasthan.

Aligarh is famous for its manufacture of locks and other brasswares. Bangles, glassware and butter are other articles of importance.

Punjab and Haryana: The two states have together an area of 105,988 sq. km with a population of little above 20 million. The States have made tremendous progress after

partition under Five Year Plans. The Bhakra-Nangal Multipurpose Project changed the whole complexion of the States: new industries have come up and there are many factories developed on a small scale. The agricultural production has also gone up. The two States together hold the second position in the production of wheat, gram, barley, maize and bajra.

The principal industries are cotton textiles (Amritsar, Ludhiana, Hissar), woollen textiles (Dhariwal, Panipat, Amritsar, Ludhiana), silk textiles (Ludhiana, Amritsar), paper (Jagadhri), sugar (Phagwara, Jagadhri, Rohtak), sports goods (Jullundur, Patiala), glass (Ambala), chemicals (Amritsar), cycles (Sonepat), cement, etc. The two States have also established their reputation in the manufacture of light engineering goods throughout the country. Amritsar, Ludhiana, Jullundur and Simla are the important trade centres. Faridabad is fast coming up as an industrial centre.

Amritsar is famous for carpets and shawls, besides having industries for textiles, acids, chemicals, hosiery and leather.

Ludhiana has developed into a centre for light engineering products and hosiery.

Jullundur is well-known for sports goods in addition to light engineering and hosiery goods.

West Bengal has an area of 87,617 sq. km with a population of about 35 million. The State is highly industrialised and the chief industries are iron and steel (Burnpur and Durgapur), jute (Hooghly basin), cotton mills (Howrah, Serampore, Calcutta), paper (Titagarh, Raniganj) and chemicals (Calcutta). Automobiles and engineering industries are also well-developed. The village industries in the State provide employment to a large number of people. The important products of the village industries are silk and cotton goods.

The production of jute is improving to meet the demand of the jute mills. 20% of country's tea is produced here. West Bengal raises about 25 per cent of the country's coal production.

The important trade centres are Calcutta, Howrah, Bhatpara, Asansol, Bally, Kharagpur and Burdwan. Serampore and Salkhia (near Calcutta) have a number of cotton mills. Batanagar is famous for shoe-making. The State has 12 cities, each with a population of over a million.

Madhya Pradesh has an area of 443,452 sq. km with a population of 32 million. It is one of the richest States of India in minerals. There are large deposits of coal, bauxite, iron, copper, manganese, limestone, etc. The important industries are cotton textiles (Indore, Gwalior, Raj Nandgaon, Ujjain, Dewas), potteries (Jabalpur), paper (Nepa Mills at Chandi), cement (Banmore, Kymore), rayon (Gwalior), heavy electricals (Bhopal), iron and steel (Bhilai), straw board (Ratlam), etc. The important trade centres are: Indore, Gwalior, Bhopal, Ujjain, Jabalpur, Dewas and Katni.

Jabalpur is noted for cement, glass, lime and potteries. It has a gun-carriage factory. Its other industries are cotton textiles, brass, copper utensils, etc.

Katni is an important centre for utensils, stones and grain.

Maharashtra has an area of 307,477 sq. km with a population of 40 million. The principal agricultural crops are rice, wheat, jowar, bajra, cotton, tobacco, groundnuts, sesame, castor seed and sugarcane. Iron ore, manganese, bauxite, coal, limestone, limenite, silica and chromite are available.

The State is a highly industrialised region in the country. There are 97 cotton mills, 20 sugar factories, a number of engineering works, chemical factories, paper mills, and automobile industry.

The important industrial trade centres are Bombay, Pune (Poona), Nagpur, Sholapur, Amravati, Akola, and Nasik. Bombay, being the major port, has become an important trading centre. Pune (Poona) is developing rapidly, where many new industries have been set up recently.

Gujarat has an area of 187,357 sq. km with a population of 20 million. A number of irrigation projects have been undertaken during the Five Year Plans to irrigate a large part of the State which is suffering from low rainfall. The principal crops are bajra, jowar, rice and wheat.

The major industries are cotton and woollen textiles, electrical engineering, chemicals and cement. The trade centres are Baroda, Surat, Ahmedabad, Bhavnagar, Jamnagar and Rajkot. Ahmedabad is famous for cotton textile industry.

Mineral deposits are considerable. Salt, limestone, manganese, gypsum, bauxite, petroleum and natural gas exist in the State. The State produces about 25% of the total salt production of the country.

Tamil Nadu has an area of 130,357 sq. km with a population 34 million. The State is rich in agricultural products like rice, sugarcane, cotton, groundnuts, tea, coffee and millets. The forest products are sandal wood, rose wood and teak. Lignite, bauxite, gypsum, iron ore and limestone are found in the State.

Tamil Nadu is also a great industrial area and the main industries are textiles, sugar, chemicals, cement, glass, automobiles, tanneries and matches. The village industries give employment to about three million people.

The important trade centres are Madras, Madurai, Tiruchirapalli, Salem and Coimbatore. Madurai has several weaving mills. Copper and brass vessels are also made here. In Tiruchirapalli, there are many cigar factories. Coimbatore is the centre of cotton textile industry.

Delhi is the capital of the Indian Republic. It is a city of historical importance. The population is about 3 million. Because of the magnificent means of communications—rail, road and air—it has gained a lot of importance as a trade centre. It has become the clearing centre for the trade items of Haryana, Punjab and U.P. The growth of new industrial areas around Delhi, like Ghaziabad, Shahdara, Faridabad, etc., has added to the commercial activities of the city. In addition, it has several modern industries like chemicals, cotton spinning and weaving mills. Ivory-carving, jewellery works, lace work and gold embroidery are the other important activities.

Orissa has an area of 155,825 km with a population of about 18 million. Though rich in forest and mineral resources, the State is still backward in industrial development. More than 60 per cent of the iron ore production of the country is raised in Orissa. The other minerals are manganese, chromite, dolomite, coal and limestone. About 40 per cent of the area is covered by forests which supply timber, bamboo, lac and various other minor products. Large-scale industries are being developed, such as steel plant at Rourkela, aluminium at Hirakud and paper mills at Chandwar. The principal trade centres are Cuttack, Puri, Berhampore and Balasore.

Cuttack is the chief town of Orissa with a population of about 150,000. The local manufactures comprise lac bangles, shoes, toys and combs. The city is about 410 km from Calcutta.

Puri is a holy place of the Hindus and is an open roadstead. As the sea is shallow, the steamers can anchor only about 11 km away from the shore. The local manufactures consist of brass, silver and golden ornaments.

Bhubaneswar is the capital of the State and is developing fast as a health resort and trade centre of importance.

Rajasthan has an area of 342,274 sq. km and a population of about 21 million. Half of the area of the State has desert conditions. The State is endowed with varied mineral resources which promise to make Rajasthan an important mining region. The industries are concerned with the production of cloth, sugar, salt, cement, ivory goods, stone work, etc. The trade centres are Jaipur, Jodhpur, Udaipur, Bikaner, Alwar, Ajmer and Kota.

Jaipur is the capital of Rajasthan. The city has a population of more than 400,000. It is famous for its artistic pottery and brassware.

Jodhpur has a railway workshop and woollen and cotton mills. Its stone work is also important.

Mysore, with an area of 192,204 sq. km and a population of 23 million, is noted for coffee plantations, sandal wood, rose wood, gold and silk. It has vast potentialities for industrial development. Sandal wood oil distillery is the biggest of its kind in the world and enjoys a virtual monopoly in production. Other industries are iron and steel at Bhadravati, cement at Shahabad, aircraft manufactures and telephone manufactures at Bangalore, porcelain at Mysore, machine tools, etc. The trade centres are Bangalore, Bellary, Hubli, Belgaum and Dharwar.

Bangalore which is about 350 km east of Madras, is the centre of industrial activities in Mysore with a population of about a million.

Jammu and Kashmir state has an area of 222,870 sq. km with a population of about 6 million. Over 85 per cent of the people depend on agriculture. The State is also rich in minerals though their exploitation is a difficult task because of inadequate means of transport. The chief sources of revenue are the village industry products and the tourists. The principal agricultural products are rice, wheat, oilseeds and saffron. The fruits like walnuts, almonds, pears and apples are extensively raised and exported. The mineral resources have not yet been developed though large deposits of coal, zinc, copper, lead, bauxite and asbestos are known to exist. Precious and semi-precious stones are commercially exploited. Woollen and silk manufactures of Kashmir are well-known for their quality and design. The trade centres are Srinagar, Jammu and Udhampur.

Srinagar is the capital of the State. It is famous for silk, embroideries and carved wood-work. The city has a population of about 300,000.

Although Kashmir has no railway communication, excellent motor roads connect the different places of the State with Srinagar and Jammu. Because of the natural scenic beauty, thousands of tourists visit Kashmir every year. Tourism thus provides one of the biggest sources of income to the State.

Kerala, with an area of 38,855 sq. km, has a population of about 17 million. The average density of population is 1125 per square km. It has a wide variety of minerals some of which are of great strategic value. Ilmenite, monazite, zircon, graphite, limestone, lignite and the mica are the principal minerals. Fishing and agriculture are the chief industries, but in recent years, the State has made good progress in manufacturing industries like ceramic, rubber, rayon, chemicals, glass, aluminium, plywood, etc. Most of the modern large-scale industries of Kerala are either government-owned or -sponsored. The trade centres are Trivandrum, Cochin, Quilon, Alleppy, Ernakulam and Trichur.

Trivandrum is an important industrial, commercial and educational centre. It is noted for coir fabrics, pencils, ivory work, cement and cashew-nuts.

Andhra Pradesh has an area of 275,244 sq. km with a population of 36 million (1961). Its landscape is characterised by mountains, hills, plateaus and plains. The two important rivers are the Krishna and the Godavari which have made the Telangana area agriculturally the most important in the State. The agricultural products are rice, oilseeds, tobacco, cotton, mesta and jowar. There are huge forest areas on the eastern and northern sides. The chief minerals in the State are coal, iron ore, limestone, manganese and asbestos. The State has made considerable progress in large-scale industry in recent years. The main industries are sugar, paper, cement jute, oil-crushing, paper, ceramic and textiles. The ship-building yard is located at Vishakhapatnam.

The trade centres are Hyderabad, Anantapur, Chittoor, Cuddapah, Guntur, Vishakhapatnam, Nellore and Kakinada.

Hyderabad with about two million population is the capital and has a number of factories for textiles and cigarettes. It is connected by railways and airways.

Vijayawada is noted for cement factories.

Assam, the most easternly State of India, has an area of 203,389 sq. km and a population of 12.2 million. Hills cover nearly 50 per cent of the total land area. The types of forests are evergreen forests, deciduous forests, swamp forests and temperate forests. In fact, all hill areas are covered by forests. Many varieties of animals are found in the forests. The fertile river basins and heavy rainfall account for the importance of both cash crops and food crops. The main cash crops are jute, tea, cotton and tobacco. Although the State contains many minerals, yet only coal and petroleum are at present worked on a commercial basis.

Tea is the main industry. Silk and cotton are manufactured as cottage industries. Assam has no textile mills. The other industries are match manufactures, boat-building, and furniture-making.

Much of the trade of Assam is carried by the Brahmaputra river. Gauhati, Tezpur, Goalpara, and Dhubri are important river ports. There is a direct railway line from Katihar to Dibrugarh.

The important trade centres are Gauhati, Shillong, Tezpur, Nowgong, Jorhat and Dibrugarh.

Shillong is the capital and is reached by a 100 km motor route from Gauhati, the nearest important river port.

Gauhati is the most important commercial centre, noted for its trade in silk, tea, and timber. It has a population of about 2 million.

Bihar has an area of 174,038 sq. km and is situated in the heart of the Ganga plain. It has a population of about 46.4 million. Although the State is very rich in mineral resources, agriculture continues to be the main occupation of 80 per cent of the population. Rice is by far the most important crop. The other crops are sugarcane, maize, wheat, barley and oilseeds.

In recent years, great progress has been made in the production of minerals like iron ore, coal, manganese, copper ore, asbestos and bauxite.

The large-scale industries are iron and steel, aluminium, electrical engineering, heavy chemicals, cement, sugar, distilleries and jute textiles.

Patna, on the bank of the Ganga, is the capital and has a population of about three million. The other main trade centres are Dhanbad, Gaya, Hazaribagh, Jamshedpur, Monghyr and Ranchi.

Questions and Discussion Topics

1. *What are the geographical and economic factors responsible for the development of a sea-port ? Give two examples from Indian ports to support your answer.*

2. *Name the major ports of India and give a short account of the importance of each of them.*

3. *What is a hinterland ? Give a brief account of the hinterlands of Calcutta, Bombay and Madras.*

4. *Discuss the commercial importance of the following: Kanpur, Vishakhapatnam, Ahmedabad, Kandla, Jabalpur, Ludhiana, Amritsar, Nagpur, Bangalore, Bhilai, Dibrugarh, Madurai.*

5. *Name and describe the importance of five ports of India which are important in the coastal trade.*

6. *Write a geo-economic account of (a) Maharashtra, (b) Gujarat, (c) Kerala, (d) Bihar and (e) Kashmir.*

7. *Write a geographical account of Maharashtra with reference to the distribution of population, trade centres and ports.*

8. *Summarise the economic geography of any one of the following: Assam, Rajasthan, Madhya Pradesh, having special regard to their usefulness as markets or as sources for raw materials for Indian industries.*

Chapter 16

Planning and India's Economic Development

We have studied so far the economic resources and their utilisation in India. The prime consideration in this regard is the optimum utilisation of our resources. Till 1947, no deliberate steps were taken by the alien Government to develop resources in the best interest of the people and the country.

Development under the First Five Year Plan

After Independence, however, it was thought that planned economic development was essential if we were to make the best use of our resources to lift us from our economic backwardness and raise the standard of living. The Planning Commission was appointed in 1950 which has been responsible for formulating the Five Year Plans beginning from 1950-51.

Planning aims at utilising the resources in men and materials in a rational manner so as to obtain maximum results for "raising living standards and opening up to the people new opportunities for a richer and more varied life." Planning relates to agriculture, forestry, fisheries, irrigation, power, mining, manufacture, trade, transport, communications, education, housing and health of the people. Their co-ordinated development will bring about a better standard of living for our people.

Planning is being done for a period of five years at a time. Different activities are carefully analysed, and targets are set for each activity. Efforts are then directed to see that conditions are created for the achievement of the targets. Targets are set year-wise up to the end of the period. The First Five Year Plan was introduced in 1950-51 to rehabilitate the economy from the ravages of war, famine and partition and to make a preparation for more rapid development in the future. Along with agriculture, irrigation, transport and power were emphasised. Agricultural production recorded substantial increase during the First Plan period. The targets of production were fully realised and some of them in fact exceeded. The national income registered an increase of 18% over three years as against the original expectation of about 12%. The total amount of investment for development under the First Plan was Rs. 2356 crores of which 24% was for transport and communication, 23% for social services, housing, etc., 16% for agricultural development, 17% for irrigation and flood control, 11% for power development and 7% for industries and minerals.

Major Crops

The greatest achievement of the First Plan was that it largely overcame the serious problem of shortage of food and essential raw materials. The increase in production of the major crops was as follows:—

Production of Major Crops

	1950-51	1955-56
Foodgrains including cereals and pulses (million tonnes)	52·2	65·8
Oilseeds (million tonnes)	5·1	5·6
Sugarcane including gur (million tonnes)	5·6	6·0
Cotton (million bales)	2·9	4·0
Jute (million lbs.)	3·3	4·2
Tea (million lbs.)	607	628
Tobacco (thousand tons)	257	298

Industrial Production

Industrial production increased mainly by a fuller utilisation of the installed capacity. A general view of such increases is given in the following table:—

Industrial Production

	1950-51	1955-56
Steel ingots (million tonnes)	1·4	1·7
Aluminium (thousand tonnes)	3·7	7·3
Cement (million tonnes)	2·7	4·6
Sulphuric acid (thousand tonnes)	99	164
Cloth:		
Mill-made (million yards)	3720	5102
Handloom, khadi & power-loom (million yards)	897	1773
Sugar (million tonnes)	1·12	1·86
Paper and Paper-board (million tonnes)	114	187
Bicycles (thousand nos.)	100	510
Sewing Machines (thousand nos.)	33	111
Minerals:		
Coal (million tonnes)	32·3	38·4
Iron ore (million tonnes)	3·2	4·3

Development of Transport

An idea of the development of transport services during the First Plan period may be had from the following figures:—

Transport Development

	1950-51	1955-56
Rail Transport		
New lines added (thousand miles)	—	380 —
Locomotives (thousand nos.)	8·5	9·2
Coaches (thousand nos.)	20·5	23·2
Wagons (million nos.)	222·4	268·5
Freight carried (million tonnes)	91·5	114·0
Road Transport		
Surfaced roads (000 miles)	97·5	122·0
Unsurfaced roads (000 miles)	151·0	114·0
Commercial vehicles on road (thousand nos.)	116	195
Shipping Tonnage (thousand GRT)	390	480

The Second Five Year Plan

With the successful completion of the First Five Year Plan, the Second Plan was drawn up in a more ambitious form. It aimed at a much higher investment on development and laid emphasis on the maximisation of the rate of capital formation through the development of basic and heavy industries. The total investment under the Second Five Year Plan was Rs. 6750 crores of which 28% was in transport and communication, 20% in industries and minerals, 18% in social services etc., 11% in agriculture, 9% in irrigation works and 10% in power development.

The achievement of the Second Plan period was not as spectacular as that of the First Plan. Agricultural production did not increase adequately. The production of foodgrains fell short of demand and heavy imports of rice and wheat became necessary. There were considerable delays in the completion of development projects. Also there was a great pressure on the foreign exchange reserves of the country as imports increased much faster than exports. The installed capacity of power generation increased from 3.4 million kw to 5.7 million kw; even then it fell short of the target of 6.9 million kw. The increase in national income was 20% as against the target of 25%.

However, the Second Plan period registered a remarkable progress in the growth of several new industries and expansion of the heavy industries. Three new steel works were completed in the public sector, and the existing steel works in the private sector were expanded and modernised. Foundations were laid for heavy electricals and heavy machine tools industries as well as of other branches of heavy engineering industry which are essential for defence in modern times. Production of machinery for the cement and paper industries were started for the first time. There was also a considerable expansion in the chemical industry.

The main indicators of development of the Second Plan period are given below:

Major Crops

	1955-56	1960-61
Foodgrains (million tonnes) ..	65·8	79·3
Net Area Irrigated (million acres)	56·2	70·3
Oilseeds (million tonnes)	5·6	7·1
Cotton (million bales)	4·0	5·4
Jute (million bales)	4·2	4·0
Mesta (million bales)	1·2	1·1
Tea (million lbs.)	628	708
Tobacco (thousand tonnes) ..	298	294

Industrial Production

Manufacturers		
Steel ingots (million tonnes) ..	1·7	3·5
Aluminium (thousand million tonnes) ..	7·3	18·5
Cement (thousand million tonnes)	4·6	8·5
Sulphuric Acid (thousand tonnes) ..	164	363
Cloth		
Mill-made (million yards) ..	5102	5127
Khadi, handloom and powerloom (million yards) ..	1773	2349
Sugar (million tonnes) ..	1·86	2·25
Paper and Paper-board (thousand tonnes) ..	187	350
Bicycles (thousand nos.) ..	510	1050
Sewing Machines (thousand nos.)	111	297
Minerals		
Coal (million tonnes)	38·4	54·6
Iron ore (million tonnes) ..	4·3	10·7

Transport Development

	1955-56	1960-61
Rail Transport		
New lines added (miles) ..	— 800	
Locomotives (thousand nos.) ..	9·2	10·6
Coaches (thousand nos.) ..	23·2	28·2
Wagons (thousand nos.) ..	268·5	341
Freight carried (million tonnes) ..	114	154
Road Transport		
Surfaced roads (thousand miles)	122	144
Unsurfaced roads (thousand miles)	195	250
Commercial vehicles on road (thousand nos.) ..	166	210
Shipping tonnage (thousand GRT) ..	480	900

The Third Five Year Plan

The Third Five Plan set the objectives of a "good life for every citizen as the ultimate goal of socialist society that the country had already accepted. The Plan was conceived as the first stage of a decade or more of intensive development leading to a self-reliant and self-generating economy. It called for an investment of Rs. 10,400 crores in both the private and public sectors, and visualised a large-scale expansion of industries. It aimed at an increase of 30% in agricultural production, 70% in industry and 30% in the national income.

Out of the total investment under the Plan, 25% was in organised industries and minerals, 17% in transport and communication, 16% in social services, 14% in agriculture, 6% in irrigation and 10% in power development.

The following table indicates the industrial progress during the Third Plan period.

Industrial Progress during the Third Plan

	1960-61	1965-66
Steel ingots (million tonnes) ..	3·5	4·6
Aluminium (million tonnes) ..	18·5	65·0
Sulphuric acid (thousand tonnes)	368	662
Foodgrains (million tonnes) ..	82·0	72·3
Oil seeds (million tonnes) ..	7·0	6·1
Cotton (million bales) ..	5·3	4·7
Cement (million tonnes) ..	8·5	10·8
Sugarcane (gur) (million tonnes) ..	11.2	12·1
Paper and paper-board (thousand tonnes)	350	558
Bicycles (thousand nos.) ..	1071	1700
Sewing machines (thousand nos.)	297	700
Automobiles (thousand nos.) ..	55·0	68·5
Electricity generated (million kwh)	..20,123	36,400
Coal (million tonnes) ..	55·7	70·0
Iron ore (million tonnes) ..	11·0	23·0
Petroleum products (million tonnes) ..	5·8	9·9

The programme of transport development under the Third Plan included an addition of 1800 km of new railway lines, increase in the surfaced road length from 240,000 to 289,000 km, increase of the number of commercial vehicles from 210,000 to 365,000 and of shipping tonnage from 900,000 GRT to 10,90,000 GRT.

The progress of development during the Third Plan had been somewhat discouraging. National income increased at an average rate of only 2.5% per annum as against the expected rise of about 4%. Agricultural production in particular had fallen short of expectations. The rate of growth of industrial production had also lagged behind. There was, however, a substantial increase in production in the basic industries including chemicals and engineering goods.

There were difficulties that stood in the way of better success of Third Five Year Plan. A considerable amount of resources and funds had to be diverted from planned projects to defence efforts on account of the Chinese attack in 1962 and Pakistan's attack in 1965. Naturally, the industrial progress got a severe set-back. On top of this, several other factors like the lack of finance, lack of capital equipment, shortage of foreign exchange, rise in population and failure of two successive monsoons made the position still more critical.

Targets under the Fourth Plan

In spite of the shortfalls of the Third Plan, the country is determined to bring about a faster growth during the years to come. The following table shows the Draft Outline of the Fourth Plan.

Physical Targets in the Fourth Plan

	1965-66	1970-71
Foodgrains (million tonnes) ..	72·3	120·0
Steel ingots (million tonnes) ..	6·2	11·7
Aluminium (thousand tonnes) ..	65	330
Cloth: Mill-made (million metres)	4434	5486
Handloom (million metres) ..	3146	4572
Iron ore (million tonnes) ..	23·0	45·2
Coal (million tonnes)	68·0	106
Petroleum products (million tonnes)	9·9	20
Railway freight (million tonnes) ..	205	308
Shipping (tonnage (hundred thousand GRT)	15·4	30

The principal characteristics of the Fourth Plan are as follows:

(*a*) highest priority to such schemes of agricultural and industrial production as are designed to promote exports and replace imports;

(*b*) maximisation of agricultural production in order to increase the supplies of food articles and agricultural raw materials;

(*c*) stepping up of production of essential mass consumption goods like textiles, sugar, drugs, kerosene, paper, etc.;

(*d*) completion of schemes for self-reliance such as metals, machinery, chemicals, mining, power and transport industries; and

(*e*) highest priority in the programme for industrial development for industries like fertilisers, insecticides and agricultural implements so as to enlarge the income of the rural population and the supplies of food articles.

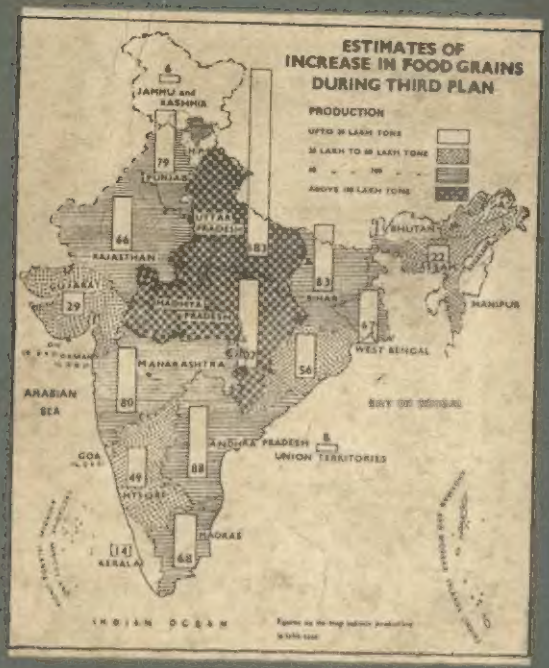
In essence, the aim is to promote rapid progress towards greater employment and social justice.

The success of the Plan will, however, depend upon our determination, enthusiasm and work. But there is one factor which is beyond our control, namely, rainfall. If the rain gods smile on us, there is no reason why the future picture of India's economy should not be an inspiring one.

Questions and Discussion Topics

1. *What are the aims of India's Five Year Plans ?*

2. *Discuss how emphasis differed in each Plan period in regard to the development of economic resources of the country.*


ESTIMATES OF
INCREASE IN FOOD GRAINS
DURING THIRD PLAN
PRODUCTION
UPTO 30 LAKH TONS
30 LAKH TO 60 LAKH TONS
60 - 100 - -
ABOVE 100 LAKH TONS
4
JAMMU and KASHMIR
79
PUNJAB
46
RAJASTHAN
83
UTTAR PRADESH
83
BIHAR
22
BHUTAN
MANIPUR
67
WEST BENGAL
29
GUJARAT
107
MAHARASHTRA
56
80
ARABIAN SEA
BAY OF BENGAL
GOA
88
ANDHRA PRADESH
5
UNION TERRITORIES
49
MYSORE
MADRAS
(14)
KERALA
68
INDIAN OCEAN